United States Environmental Protection Agency
Region 9

In the Matter of :	
Motorola, Inc. Beckman Instruments, Inc. Siemens Corporation Edward H. Johnson, d.b.a. The Strip Joynt Marro Plating Plainville West Salt River Project Advanced Auto Supply	Docket No. 89-15 AMENDED ORDER Docket # 90-05
Respondents	
Proceeding under Section 106 of the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986, (42 U.S.C. § 9606)	

I. Jurisdiction

This amended Order is issued to Respondents pursuant to the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986 (CERCLA), by authority delegated to the Administrator of the United States Environmental Protection Agency (EPA), and redelegated to the EPA regions.

The Director of the Hazardous Waste Management Division, EPA Region 9, has determined there may be an imminent and substantial endangerment to the public health, welfare or the environment because of the release or threatened release of hazardous substances from that portion of the Indian Bend Wash Superfund site that is bounded by Chapparal, Scottsdale, and Pima Roads and the Salt River (hereinafter referred to as the "Site").

This amended Order directs Respondents to undertake actions that EPA has determined to be necessary to protect the public and the environment from this potential endangerment.

II. Findings of Fact

The following facts are a synopsis of data contained in the Administrative Record of EPA's Record of Decision for the Site, dated September 21, 1988. This Record of Decision (ROD) is incorporated by reference as if fully set forth herein.

A. In 1981, the Arizona Department of Health Services determined that volatile organic compounds (VOCs) were present in municipal wells located at the Site.

B. The Site was placed on the National Priorities List in 1983 as a result of the VOC contamination detected in the municipal wells.

C. Concentrations of VOCs have exceeded 1000 parts per billion (ppb) in various City of Scottsdale ("City") production wells at the Site.

D. Motorola, Inc. ("Motorola") operates an electronic component manufacturing facility at 8201 East McDowell Road, Scottsdale, Arizona, within the Site. Motorola used on-site

evaporation/percolation ponds for the disposal of mixed chemicals such as: solvents, waxes, and other chemical residue. On October 10, 1981, Motorola personnel reported a spill from a 500-gallon waste solvent tank. In December, 1986, there was a release of 1,1,1-trichloroethane ("1,1,1-TCA") from the Motorola facility. Soil gas samples from the facility indicate tricholorethylene ("TCE") levels up to 500 ppb and tetrachloroethylene ("PCE") levels up to 4900 ppb. Samples from ground water monitoring wells at the Motorola facility indicate levels of TCE up to 2500 ppb.

E. From January, 1979 to March, 1982, Beckman Instruments, Inc. ("Beckman") operated a facility at 350 North Hayden Road, Scottsdale, Arizona, within the Site. The facility manufactured plainer gas discharge displays and TCE was used as a cleaning solvent. There is evidence that Beckman disposed of TCE in on-site drains and directly onto unpaved ground. On-site soil gas samples at the former Beckman facility indicate TCE at 10 ppb and dichloroethylene ("DCE") at 19 ppb, and downgradient ground water monitoring samples indicate TCE levels up to 120 ppb.

F. Between 1960 and 1974, Dickson Electronics ("Dickson") manufactured electrical components at various locations, including 8700 East Thomas Road, Scottsdale, Arizona, within the Site. In 1974, Dickson was acquired by the Siemens Corporation ("Siemens"). Siemens continued to operate the facility at 8700 East Thomas Road until July, 1982. As part of the zener diode manufacturing process, Dickson used TCE for wax-etching and waste removal. Dickson sent spent TCE to on-site sewers and dry

wells/cesspools. Samples from on-site soil borings at the former Dickson/Siemens facility indicate TCE concentrations up to 7,300 ppb and ground water samples at the facility show levels of TCE at 73 ppb.

G. Marro Plating and Plainville West occupy the property at 7811 East Pierce Street, Scottsdale, Arizona, within the Site. Both companies have used TCE and 1,1,1-TCA in connection with their on-site metal finishing activities. Samples from on-site soil gas testing indicate concentrations of TCE at 20 ppb, DCE concentrations of 19 ppb and 1,1,1-TCA concentrations of 6.5 ppb. Soil borings at the facility indicate 1,1,1-TCA concentrations of 24.4 ppb. Ground water samples from wells approximately 300 feet downgradient indicate TCE concentrations of 73 ppb.

H. Edward H. Johnson did business as The Strip Joynt at 7315 East 2nd Street, within the Site. From September 1972 to September 1986, Mr. Johnson used paint strippers in his on-site operations. Mr. Johnson disposed of waste paint sludge on-site at a rate of at least 5 gallons per month. Soil samples at the facility show TCE levels of 200 ppb. Ground water samples within 1/4 mile of the facility show TCE concentrations up to 1000 ppb.

I. The Salt River Project (SRP) owns and operates a number of ground water wells at the Site that provide irrigation water. SRP used lubrication oil in its well pumps that contained solvents with organic halide concentrations up to 1000 ppm. Samples from soils near the SRP wells indicate concentrations of dichloromethane of 1200 ppb, carbon tetrachloride of 400 ppb and chloroform of 600 ppb. Ground water samples from SRP wells show

TCE concentrations of 463 ppb and chloroform of 28 ppb.

J. Advanced Auto Supply operates a facility at 7811 E. McDowell Road, Scottsdale, Arizona, within the Site. Automobile components are machined at the facility. A September 1, 1988 Spill Incident Report states that the contents of a "cold vat solvent tank" were disposed of into an on-site drain and the subsequent odor of solvents was extremely strong. Surface soils were sampled with an "HNu" instrument by the Arizona Department of Environmental Quality and found to contain a concentration of phenol of at least 5 ppm. Soil samples indicate concentrations of TCE at 30 ppb.

K. TCE is a known animal and probable human carcinogen. TCE can produce central nervous system depression and irritation of the eyes, nose and throat. Exposure to high concentrations of TCE may cause nausea and vomiting. It can also cause neurological impairment, liver and kidney damage, and at high concentrations, death. The primary drinking water standard for TCE is 5 ppb.

L. Chloroform is a known animal and suspected human carcinogen. It may also be mutagenic and cause birth defects. Chloroform can cause liver and kidney damage, headaches, unconsciousness and death.

M. Dichloromethane is a known animal and suspected human carcinogen. It is also known to cause mutations in animals. Acute exposure to dichloromethane produces narcotic effects, nausea, lassitude, headaches, labored breathing, unconsciousness and death in humans. Chronic exposure can also produce be-

havioral and nervous systems disorders in humans, leading to suicide.

N. DCE is a possible human carcinogen. Exposure to this chemical may result in liver function abnormalities, headaches, vision problems, weakness, fatigue and neurological sensory disturbances.

O. 1,1,1-TCA is a possible animal carcinogen.

P. PCE is a known animal and suspected human carcinogen. Exposure to PCE may result in central nervous system depression, eye and throat irritation, headaches and nausea. It can also cause damage to the liver and kidneys.

Q. The compounds described in Subparagraphs K, L, M, N, O and P of this Paragraph II are organic halide compounds.

R. People may be exposed to contaminated ground water at or from the Site through ingestion, bathing, cooking, dermal contact, and other domestic uses of water.

III. Conclusions of Law

A. Respondents are "persons" as defined in Section 101(21) of CERCLA, 42 U.S.C. §9601(21).

B. The Site is a "facility" as defined in Section 101(9) of CERCLA, 42 U.S.C. §9601(9).

C. TCE, 1,1-DCE, PCE, 1,1,1-TCA, chloroform, dichloromethane, carbon tetrachloride and phenol are "hazardous substances" as defined in Section 101(14) of CERCLA, 42 U.S.C. §9601(14).

D. The disposal of hazardous substances and the continued migration of those substances in the ground water, and to the

ground water from contaminated soils at the Site, constitute a "release" or "threatened release" of hazardous substances into the environment as defined in Section 101(22) of CERCLA, 42 U.S.C. §9601(22).

E. Siemens is liable under Section 107(a) of CERCLA, 42 U.S.C. §9607(a), in part as a successor of Dickson.

F. Respondents are liable under Section 107(a) of CERCLA, 42 U.S.C. §9607(a).

IV. Determinations

Based on the Findings of Fact and Conclusions of Law, the Director, Hazardous Waste Management Division, EPA Region 9, has made the following determinations:

A. The release or threatened release of hazardous substances and pollutants or contaminants from the Site may present an imminent and substantial endangerment to the public health, welfare, or the environment. This determination is embodied in Appendix A attached hereto.

B. In order to prevent or mitigate a significant risk of harm to human health and the environment, remedial action must be taken to prevent migration or exposure to contaminated ground water at and emanating from the Site.

C. The remedial measures required by this amended Order are consistent with the National Contingency Plan, 40 C.F.R. Part 300.

V. Work To Be Performed

Based upon the Findings of Fact, Conclusions of Law and Determinations, Respondents are hereby ordered to implement the

following measures under the direction of EPA's Project Coordinator:

A. Respondents shall finance and perform the implementation of the Work (also known as the Operable Unit ("OU")) as specified by the ROD and this amended Order. "Work" shall consist of the installation and operation of the monitoring system identified in Appendix B to this amended Order; design and construction of a groundwater extraction and treatment system, including design, construction and operation and maintenance of a treatment plant; design, construction, operation and maintenance of a treated water end use system, if necessary; preparation of the Study of Ground Water Alternatives described in Subsection VI.C.4 of this amended Order and all other tasks to be performed by the Respondents pursuant to this amended Order, and any schedules and plans required to be submitted hereto.

B. Respondents shall implement and complete the Work in accordance with the National Oil and Hazardous Substance Pollution Contingency Plan (NCP), as set forth in 50 Fed. Reg. 47912 (1985), and all amendments thereto that are effective and applicable to any activity undertaken pursuant to the amended Order, and also in accordance with the standards, specifications, and schedules of completion set forth in or approved by EPA pursuant to this amended Order. All work shall be performed by qualified employees or contractors of Respondents.

C. Requirements for the Work:

1. Ground Water Monitoring System:

Respondents shall identify the zone of contamina-

tion at the Site and the zone of hydraulic capture for the OU by means of ground water monitoring as specified in Appendix B. The "zone of contamination" shall include all ground water in the Middle Alluvial Unit ("MAU") and Lower Alluvial Unit ("LAU") within the Site with a concentration of any hazardous substance higher than the Safe Drinking Water Act Maximum Contaminant Level ("MCL") for that substance, or with a concentration higher than the State of Arizona Action Level for any hazardous substance for which there is no MCL. The "zone of hydraulic capture" or "zone of capture" is defined as the groundwater zone in which the hydraulic gradient is oriented toward the Operable Unit extraction wells such that groundwater within the zone of capture will eventually be extracted by those wells.

2. Ground Water Extraction System:

a) Respondents shall establish a zone of capture by extracting ground water to create an inward hydraulic gradient encompassing the entire zone of contamination both laterally and vertically. The zone of capture shall be verified by ground water monitoring in accordance with the OU Ground Water Monitoring System specified in Appendix B to this amended Order.

b) Respondents shall acquire access to existing ground water wells or construct new ground water wells with ground water pumping capacity sufficient to control the zone of contamination at the Site.

c) Existing City wells may be used for the ground water extraction system only if permission of the City is obtained by Respondents.

d) In addition, the Respondents shall adjust the zone of capture to account for naturally occurring changes in the hydrological system and to account for ground water pumping by others in the vicinity of the Site.

3. Ground Water Treatment Plant

a) Respondents shall construct a ground water treatment plant ("Plant"), to treat ground water according to a design to be submitted by EPA (the "Design"). The Plant shall include piping to the treatment facility from all new or existing ground water extraction wells included as part of the Ground Water Extraction System and shall also include any necessary piping from the treatment facility to any reservoir or facility to be utilized by the Respondents as part of the end use for the treated water. The Plant shall have an initial capacity to treat at least 8400 gpm of ground water. Respondents shall expand the capacity of the Plant beyond 8400 gpm as necessary to control the zone of contamination or as determined to be necessary by EPA for any other reason consistent with the NCP.

b) Consistent with the ROD, the Respondents shall use packed column aeration (air stripping) to reduce volatile organic compound ("VOC") contamination to meet the following treatment goals, as set forth in Table VII-2 of the ROD, and all other applicable state and federal water quality standards:

Compound	Treatment Goal (micrograms/liter)
Trichloroethylene	5
1,1,1-Trichloroethane	200
1,1-Dichloroethlyene	7
Tetrachloroethylene	0.67
Chloroform	0.5

The air stripping towers shall be equipped with activated carbon adsorption units that shall be operated continuously to remove at least 95% of VOC air emissions.

c) Any measurable noncompliance with the prescribed water quality discharge levels shall be reported orally to EPA within forty-eight (48) hours of discovery and in writing within seven (7) days of discovery. The written submission shall include a description of the noncompliance and its cause; the period of noncompliance, including the dates and times; and, if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate and prevent reoccurrence of the noncompliance. Compliance with these reporting requirements shall not excuse any penalties resulting from noncompliance with the prescribed treatment discharge levels.

d) After EPA determines that the Plant is operational ("Certification of Completion"), Respondents shall arrange to either 1) provide an on-site end use of the water, such as reinjection, in accordance with applicable law, or 2) transfer the Plant to the City.

e) Respondents shall acquire real property suitable for construction of the Plant. This requirement shall be satisfied through acquisition of the parcel described immediately below or of some other parcel of equivalent suitability, subject to the approval of EPA:

> The North 330.00 feet of the West 130.00 feet of the East 491.67 feet of the West 842 feet of the South Half of the Southeast Quarter of the Southeast Quarter of Section 25, Township 2 North, Range 4 East of the Gila and Salt River

Base and Meridian, Maricopa County, Arizona. If the Respondents cannot acquire the parcel at fair market price despite their best efforts, the Respondents may request that EPA assist the Respondents in acquiring the land. In the event that EPA assists the Respondents in acquiring the land, the Respondents shall reimburse EPA for any acquisition costs it incurs.

4. Study of Ground Water Alternatives

Respondents shall submit a study to EPA that 1) analyzes alternatives for expanding the pumping and treating capability of the system at various locations to optimize cleanup of the ground water and/or to supply additional water to the City for supply to its customers in a manner consistent with the NCP and 2) analyzes recharge and reinjection of ground water at the Site to optimize ground water cleanup, consistent with the final remedy to be determined for this Site.

5. Operations and Maintenance

Respondents shall operate and maintain the Ground Water Monitoring System described in Appendix B. Respondents shall also operate and maintain the Ground Water Extraction System, the Ground Water Treatment Plant and any end use system necessary in the event that the Respondents do not transfer the Plant to the City. Operations and maintenance shall include the replacement of any necessary equipment, including well pumps.

VI. Schedule For The Work

Except where noted otherwise, all dates referred to in the following schedule are calendar days; however, should a deadline

fall on a weekend or a Federal holiday, the deadline shall be construed to continue to the next business day.

A. Respondents shall begin and complete installation of the OU Ground Water Monitoring System in accordance with Appendix B to this amended Order.

B. Within 120 days of the effective date of this amended Order, Respondents shall submit a copy of a purchase contract for the real property required by Paragraph V.C.3.e of this amended Order. If, however, the Respondents have not been able to acquire the parcel at fair market price despite their best efforts, and if the Respondents choose, therefore, to request EPA's assistance in acquiring the land, they shall submit a written request for EPA's assistance within 90 days of the effective date of this amended Order.

C. Within 150 days of the effective date of this amended Order, Respondents shall submit a Health and Safety Plan for construction of the Plant.

D. The Respondents shall have 60 days from the date of receiving the Design from EPA to propose modifications to the Design.

E. After reviewing the Respondents' proposed Design changes, EPA will incorporate any proposed Design changes that if determines are appropriate and instruct the Respondents to initiate construction.

F. Within six months of initiating construction of the Plant, the Respondents shall submit a Quality Assurance/Quality Control ("QA/QC") Plan for water and air effluent and influent

sampling relating to the startup and routine operation of the Groundwater Extraction System and the Plant. The QA/QC Plan shall include elements necessary for the implementation of trial test(s) of the pumping, treatment and end-uses implemented as part of the Work. The QA/QC Plan shall include a description of the mechanism that shall be used to verify that the pumping, treatment and end use process is operating within acceptable limits. Upon approval and notice by EPA to Respondents, Respondents shall implement the QA/QC Plan.

G. Within eleven months of initiating construction of the Plant, Respondents shall have completed construction of the Plant and shall begin startup activities. Startup activities shall include the initial period of operation of the Plant and the Ground Water Extraction System to determine equipment capabilities and actual operating parameters.

H. Within three months of beginning startup activities, Respondents shall demonstrate to EPA's satisfaction that the Groundwater Extraction System and the Plant are functioning in accordance with specifications.

I. Within 30 days of Certification of Completion, the Respondent shall begin routine operation of the Plant and, subject to agreement by the City and approval by EPA, shall either a) provide an on-site end use, such as reinjection, in accordance with applicable law, or b) transfer the Plant to the City.

J. Respondents shall provide the Study of Ground Water Alternatives required in Paragraph V.C.4 within 2 years of achieving routine operations of the Plant.

K. If the Respondents do not transfer the Plant to the City, the Respondents shall sample treated water at least every seven days. Results of these samples shall be transmitted to EPA and the City of Scottsdale directly from the laboratory within seven days of the sampling event. If the Respondents transfer the Plant to the City, the Respondents shall analyze treated water samples submitted by the City every seven days. Results of these samples shall be transmitted to EPA and the City of Scottsdale directly from the laboratory within seven days.

L. Monthly Progress Reports

Respondents shall provide written progress reports to EPA on a monthly basis. These progress reports shall describe all actions taken to comply with this amended Order, including a general description of the Work activities commenced or completed during the reporting period, Work activities projected to be commenced or completed during the next reporting period, and any problems encountered or anticipated by Respondents in commencing or completing the Work activities. These progress reports shall be submitted to EPA by the tenth day of each month for work done the preceding month and planned for the current month.

M. Reports, Plans, and Other Items

1. All reports, plans, specifications (including discharge or emission limits), schedules, appendices, and attachments required or established by this amended Order are, upon approval by EPA, incorporated into this amended Order. Any noncompliance with such EPA-approved reports, plans, specifications (including discharge or emission limits), schedules, appendices,

or attachments shall be considered a violation of this amended Order subject to penalties in accordance with Paragraph XIII of this amended Order.

2. If EPA disapproves any plan or report (other than a monthly progress report) or other item required to be submitted to EPA for approval pursuant to this amended Order, Respondents shall correct any deficiencies, by addressing all EPA comments, and resubmit the plan, report or item for EPA approval within ten (10) working days from the receipt of such disapproval.

3. Submission of a deficient plan, report or other submittal is a violation of this amended Order subject to penalties in accordance with Paragraph XIII if resubmission does not correct the deficiencies of the original submission.

4. Health and Safety Plans required under (or otherwise prepared pursuant to) this amended Order shall satisfy the requirements of the OSHA "Hazardous Waste Operations and Emergency Response Standard," 29 CFR §1910.120 and EPA's Standard Operating Safety Guides. Upon review and notice by EPA to Respondents, Respondents shall implement any such the Health and Safety Plan.

5. QA/QC Plans required under this amended Order shall, where applicable, be prepared in accordance with current EPA guidance, Interim Guidelines and Specifications for Preparing Assurance Project Plans, QAMS-DO5/80, and subsequent amendments to such guidelines upon written notification by EPA to Respondents of such amendments.

6. The QA/QC Plan shall specify utilization of stan-

dard EPA chain of custody procedures, as documented in National Enforcement Investigations Center Polices and Procedures Manual, as revised in May 1986, and the National Enforcement Investigations Center Manual for the Evidence Audit, published in September 1981, for all sample collection and analysis activities. In order to provide quality assurance and maintain quality control regarding all samples collected pursuant to this Consent Decree, the QA/QC Plan shall also:

a. Ensure that all contracts with laboratories used by Respondents for analysis of samples taken pursuant to this amended Order provide for access of EPA personnel and EPA authorized representatives to assure the accuracy of laboratory results related to the Work.

b. Ensure that all laboratories used by Respondents for analysis of samples taken pursuant to this amended Order perform all analyses according to accepted EPA methods or methods deemed in advance satisfactory by EPA. Accepted EPA methods are documented in the "Contract Lab Program Statement of Work for Inorganic Analysis" and the "Contract Lab Program Statement of Work for Organic Analysis" dated July 1985.

c. Ensure that all laboratories utilized by Respondents for analysis of samples taken pursuant to this amended Order participate in an EPA or EPA-equivalent QA/QC program. As part of the QA/QC program and upon request by EPA, such laboratories shall perform at their expense analyses of samples provided by EPA to demonstrate the quality of each laboratory's data. EPA may provide to each laboratory a maximum

of four samples per year per analytical combination (e.g., four aqueous samples for analysis by gas chromatography/mass spectrometry, four soil/sediment samples for analysis by gas chromatography/mass spectrometry).

7. Respondents shall submit a quality assurance report to EPA on a quarterly basis on January 30th, April 30th, July 30th, and October 30th of each year. This report shall contain information that demonstrates that Respondents are complying with this paragraph and the QA/QC Plan submitted and approved pursuant to this amended Order.

8. Any analytical and design data generated or obtained by Respondents that are related to the Work shall be provided to EPA within seven (7) days of any request by EPA for such data.

9. EPA employees and EPA's authorized representatives shall have the right, upon request, to take splits of any samples obtained by Respondents or anyone acting on their behalf in the implementation of the Work.

10. During design, construction, and start-up activities, Respondents shall notify EPA seven (7) days prior to any sampling conducted by them or anyone acting on their behalf. EPA shall be notified thirty (30) days prior to the disposal of any such sample, and EPA shall have an opportunity, upon request, to take possession of all or a portion of such sample.

For sampling performed pursuant to schedules approved by the EPA, Respondents need not provide EPA with 7-day notice. Respondents shall notify EPA seven (7) days in advance

of any changes in the routine sampling schedule. Respondents need not provide EPA with advance notice of changes in the routine sampling as a result of unexpected conditions. Respondents shall, however, notify EPA within forty-eight (48) hours of the occurrence of any such conditions and shall provide EPA with the results of analysis of such sampling when the results become available.

11. Respondents shall demonstrate their ability to complete the Work and to pay all claims that arise from the performance of the Work by obtaining, and presenting to EPA for approval within seventy-five (75) days of the effective date of this amended Order, a performance bond or letter of credit. In lieu of any of the two items listed above, Respondents may present to EPA, within sixty (60) days of the effective date of this amended Order, financial information sufficient to satisfy EPA that Respondents have sufficient assets to make it unnecessary to require additional assurances. If Respondents rely on financial information for financial assurance, they shall submit such financial information on a quarterly basis. If EPA determines the financial assurances to be inadequate, Respondents shall obtain one of the two instruments listed above within 30 days of the EPA response.

12. Respondents shall maintain a segregated account dedicated to funding their obligations pursuant to this amended Order. Within ninety (90) days of the effective date of this amended Order and at the beginning of every calendar quarter thereafter, Respondents shall submit an account statement to EPA

demonstrating that the account is funded adequately to ensure performance of their obligations under this amended Order for the following calendar quarter.

13. All data, factual information, and documents submitted by Respondents to EPA pursuant to this amended Order shall be subject to public inspection. Respondents shall not assert a claim of confidentiality regarding any hydrogeological or chemical data, any data submitted in support of a remedial proposal, or any other scientific or engineering data. Respondents may assert a claim of confidentiality as to any process, method, technique, or any description thereof that Respondents claim constitutes proprietary or trade secret information developed by them or by their contractor(s) or the contractors' subcontractors. In addition, Respondents may assert business confidentiality claims covering part or all of the information provided in connection with this amended Order in accordance with Section 104(e)(7) of CERCLA, 42 U.S.C. § 9604(e)(7) and pursuant to 40 C.F.R. § 2.203(b) or applicable state law. Any such claim shall be subject to EPA's confidentiality determination procedures and, if the information is determined to be confidential, it will be afforded the protection by EPA provided in 40 C.F.R., Part 2, Subpart B.

14. Respondents shall preserve and retain all records and documents now in their possession or control that relate in any manner to the Site, regardless of any document retention policy to the contrary, for no less than six years after the EPA deems the OU complete, and shall also direct their contractors,

their subcontractors, and anyone else acting on Respondents' behalf at the Site to do so. Records and documents shall be preserved in the form of originals or exact copies, or in the alternative, microfiche of all originals. Upon request by EPA, Respondents shall deliver copies of all such records and documents to the EPA Project Coordinator.

VII. Compliance With Other Laws

Respondents shall comply with all federal, state and local laws and regulations in carrying out the terms of this amended Order. All hazardous substances removed from the Site shall be handled in accordance with the Resource Conservation and Recovery Act of 1976, 42 U.S.C. § 6921, et seq., the regulations promulgated under that Act, and EPA's Off Site Disposal Policy, OSWER Directive 9834.11.

VIII. Project Coordinator

EPA has appointed a Project Coordinator for the Site who has the authority vested in the Remedial Project Manager and the On-Scene Coordinator by 40 C.F.R. Part 300, et seq., including such authority as may be added by amendments to 40 C.F.R. Part 300, as well as the authority to ensure that this amended Order is implemented in accordance with all applicable statutes and regulations. The EPA Project Coordinator for the purposes of this amended Order is:

Daniel Opalski (H-7-2)
United States Environmental Protection Agency
Region 9
215 Fremont Street
San Francisco, California 94105 (415) 547-7563

The Project Coordinator for the City of Scottsdale for the purposes of this amended Order is:

Jim Nelson
City of Scottsdale
3939 Civic Center Plaza
Scottsdale, AZ 85252 (602) 391-5687

Within forty-five days of the effective date of this amended Order, Respondents shall designate a Project Coordinator to monitor their progress in implementing this amended Order and to coordinate communication between EPA and Respondents. EPA and Respondents may change their respective Project Coordinators upon five days notice.

IX. Submittals And Approvals

All submittals and notifications to EPA required by this amended Order or the plans submitted hereunder shall be made to the EPA Project Coordinator at the address above.

All approvals and decisions of EPA made regarding submittals and modifications under this amended Order will be communicated to Respondents by the Director, Hazardous Waste Management Division, or his designee. No informal advice, guidance, suggestions, or comments by EPA regarding reports, plans, specifications, schedules, or any other matter shall relieve Respondents of their obligation to obtain formal approvals as required by this amended Order.

No approval by EPA, including approval of the Design submitted to Respondents pursuant to Paragraph V.C.3, shall constitute a warranty of any kind or relieve Respondents of their obligation to implement the Work in accordance with the requirements of the ROD, this amended Order, and all applicable laws and

regulations.

X. Access

To the extent that access to or easements regarding property at the Site is required for the proper and complete compliance with this amended Order, Respondents shall obtain access agreements from the owners or from persons who have control over the property within one hundred twenty (120) days of the effective date of this amended Order. Access agreements shall provide reasonable access to Respondents and EPA and their authorized representatives. In the event that access agreements are not obtained within the 120-day period, Respondents shall notify EPA within five (5) calendar days thereafter regarding both the lack of, and their efforts to obtain, such agreements. If necessary, EPA may exercise its legal authority to assist Respondents in obtaining access. In the event EPA exercises its access authorities under Section 104(e) of CERCLA, 42 U.S.C. §9604(e), in order to obtain access for the performance of any act required by this amended Order, Respondents shall be liable for reimbursement to EPA of any costs incurred in the exercise of such powers.

In the event that any Respondent transfers some or all of its property located within the boundaries of the Site to a third party after the effective date of this amended Order, that Respondent shall (a) assure that the instrument effecting the conveyance or transfer of title contains a copy of this amended Order, the ROD and the listing of the Site on the National Priorities List pursuant to CERCLA; and (b) use its best efforts to assure access to the property for EPA and Respondents from the

third party.

Nothing in this amended Order shall limit any access rights that EPA or other agencies may have pursuant to law.

XI. Endangerment During Implementation

The Director, Hazardous Waste Management Division, EPA Region 9, may determine that acts or circumstances (whether related to or unrelated to this amended Order) may endanger human health, welfare or the environment and may order Respondents to stop further implementation of this amended Order until the endangerment is abated. EPA may also for any other reason permitted by law order Respondents to cease activities at the Site.

XII. United States Not Liable

A. The United States, its agencies, employees and other representatives, shall not be liable for any injuries or damages to persons or property resulting from the acts or omissions of Respondents, their employees or other representatives caused by implementation of this amended Order or otherwise.

B. The United States, its agencies, employees and other representatives, shall not be deemed to be a party to any contract with Respondents.

XIII. Noncompliance

A. A willful violation or failure or refusal to comply with any terms of this amended Order shall subject Respondents to a civil penalty of up to $25,000 per day in which the violation occurs or failure to comply continues, pursuant to the provisions of Section 106(b)(1) of CERCLA, 42 U.S.C. §9606(b)(1). Failure to comply with any terms of this amended Order without sufficient

cause shall also subject Respondents to punitive damages of up to three times the total costs incurred by the United States for Site response pursuant to Section 107(c)(3) of CERCLA, 42 U.S.C. § 9607(c)(3).

B. EPA may order or independently initiate additional response actions it deems necessary to protect public health, welfare, or the environment.

XIV. Opportunity to Confer

Respondents may request a conference with the Assistant Director for Superfund, Hazardous Waste Management Division, EPA Region 9, or his staff to discuss the provisions of this amended Order. At any conference held pursuant to such a request, Respondents may appear by counsel or other representatives for the purpose of presenting any objections, defenses or contentions which Respondents may have or wish to make regarding this amended Order. The conference will be recorded by a court stenographer. If Respondents desire such a conference, they must make a request orally by January 20, 1990, and confirm the request in writing within three working days. Requests shall be made to the EPA Project Coordinator or Regional Counsel.

XV. Parties Bound

This amended Order shall apply to and is binding upon Respondents, their officers, directors, agents, employees, contractors, successors, and assigns.

XVI. Notice of Intent to Comply

By January 20, 1990, Respondents shall orally inform EPA of their intent to comply with the terms of this amended Order. The

oral notice shall be confirmed within three (3) working days by written notice to the Director. Failure to provide such notice in a timely manner will be deemed by EPA to be a willful refusal to comply.

XVII. Notice to State

Notice of the issuance of this amended Order has been given to the State of Arizona. EPA will consult with the Arizona Department of Environmental Quality and Department of Water Resources, as appropriate, to ensure that the plans submitted by Respondents pursuant to this amended Order are consistent with State requirements.

XVIII. Effective Date

Notwithstanding any conferences that may be requested pursuant to the provisions of this amended Order, this amended Order shall be effective on December 15, 1989.

IT IS SO ORDERED on this 14th day of December, 1989 at San Francisco, California.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

by _____

Jeff Zelikson

Director, Hazardous Waste Management Division EPA, Region 9

Appendix A

Determination of Imminent and Substantial Endangerment

Site: That portion of the Indian Bend Wash Superfund Site in and near Scottsdale, Arizona, bounded by Chapparal, Scottsdale and Pima Roads and the Salt River (the "Site")

DOCUMENTS REVIEWED:

My determination is based on the Environmental Protection Agency (EPA) Administrative Record for the Record of Decision for the first Operable Unit at the Indian Bend Wash Superfund Site, dated September 21, 1988.

DETERMINATION:

Section 106(a) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (CERCLA), provides that, when the President of the United States determines that there may be an imminent and substantial endangerment to the public health, welfare, or the environment because of an actual or threatened release of a hazardous substance from a facility to the environment, he may issue such Orders as may be necessary to protect public health, welfare or the environment.

The Administrative Record referenced above conclusively demonstrates that hazardous substances have been released to the environment at the Site. The Administrative Record contains an Operable Unit Feasibility Study (OUFS) which includes a Background and Site History (Chapter 1 of the OUFS). This chapter documents the extent of the releases of hazardous substances based on the results of ground water sampling (Pages 1-5 through 1-6). This sampling demonstrates that the ground water at the Site is contaminated with hazardous substances including, but not limited to, volatile organic compounds such as trichloroethylene, 1,1-dichloroethylene, 1,1,1-trichloroethane, tetrachloroethylene, and chloroform and demonstrates the threat to the environment posed by the releases. The OUFS also includes a Public Health Evaluation (Chapter 2 of the OUFS) which documents the risk to human health and welfare presented by the observed releases. The OUFS has been submitted to the public for comment.

Pursuant to the CERCLA §106 authority delegated to me by the President, through the EPA Administrator, I hereby determine that the Administrative Record and, specifically, the Background and Site History, and the Public Health Evaluation, demonstrate that an imminent and substantial endangerment to human health, welfare or the environment may exist because of the actual and threatened releases of hazardous substances at the Site.

Dated: this 14th day of December, 1989 at San Francisco, California.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

by Jeff Zelikson for
Jeff Zelikson
Director
Hazardous Waste Management Division
EPA, Region 9

APPENDIX B

Scottsdale Operable Unit (OU) Monitoring Program
Indian Bend Wash (North) Superfund Site

The OU Monitoring Program shall be used to (1) identify the zone of contamination and (2) identify the zone of hydraulic capture. The "zone of contamination" shall include all ground water in the Middle Alluvial Unit ("MAU") and Lower Alluvial Unit ("LAU") within the Site with a concentration of any hazardous substance higher than the Safe Drinking Water Act Maximum Contaminant Level ("MCL") for that substance, or with a concentration higher than the State of Arizona Action Level for any hazardous substance for which there is no MCL. The "zone of hydraulic capture" or "zone of capture" is defined as the groundwater zone in which the hydraulic gradient is oriented toward the Operable Unit extraction wells such that groundwater within the zone of capture will eventually be extracted by those wells.

The OU Monitoring Program shall consist of the components listed below, as described in this Appendix.

A. Installation of New Monitoring Wells
B. Ground Water Data Collection
C. Pumping Data Collection
D. Compilation of Salt River Flow Data
E. Subsidence Data Collection

Submission of reports in conjunction with these components is discussed below.

A. <u>Installation of New Monitoring Wells</u>

Respondents shall construct and develop 12 new Middle Alluvial Unit (MAU) monitoring wells and 11 new Lower Alluvial Unit (LAU) monitoring wells at the approximate locations shown in the attached figure, dated December 5, 1989. Respondents shall install the monitoring wells according to the attached technical specifications, excepting any revisions proposed by the Respondents and approved by EPA. At all locations where both MAU and LAU wells are to be installed, the LAU well shall be constructed and logged prior to the installation of the MAU well at the Site. In addition, once field work has begun at a particular well site, the construction of wells at that site shall be completed before the Respondents proceed to the next well site. The LAU monitor wells shall be screened in the top 50 feet of the LAU. The completion depth and screened interval for MAU wells at sites KK, LL, MM and NN shall conform to the completion depth and screened interval for MAU wells now

in place. A 50-foot completion interval for the remainder of the MAU wells shall be chosen based upon all available lithologic, hydraulic and water quality data.

Respondents shall install dedicated pumps for obtaining water quality samples. Immediately after completing construction and development of each well, the Respondents shall collect at least two rounds of water quality samples ("post-completion samples") at two week intervals and analyze them using EPA Method No. 624/8240 for volatile organic compounds (VOCs), EPA Method No. 625/8270 for base/neutral and acid extractable organics and EPA-approved methods for common ions and trace metals. Each round of sampling shall also include measuring the groundwater elevation. The post-completion sampling and water quality analyses shall be considered part of the installation of the wells. The Respondents shall perform the sampling and analysis in accordance with field and laboratory procedures approved in advance by EPA.

Respondents shall begin field activities associated with the installation of the new monitoring wells by January 31, 1990 and shall complete installation of all 23 new monitoring wells by December 31, 1990.

By October 15, 1990, the Respondents shall submit a Monitoring Well Installation Summary Report for all wells installed by September 1, 1990. This report shall include, at a minimum, a discussion of any difficulties encountered during well installation, well construction details, well diagrams (including indications of screened intervals), lithologic logs, geophysical logs, data and QA/QC documentation from post-completion sampling and a map indicating the final well locations. By February 15, 1991, the Respondents shall submit a Monitoring Well Installation Summary Report for the remainder of the 23 new monitoring wells required under this program.

B. Ground Water Data Collection

Respondents shall obtain groundwater elevations and collect groundwater samples for water quality analyses from all new monitoring wells installed pursuant to this Appendix and at the following existing monitoring wells:

COS 71	E-3UA	E-10MA	M-7MA	M-16MA	M-9LA
COS 72	E-4UA	M-1MA	M-9MA	S-1MA	M-10LA
COS 73	M-12UA	M-2MA	M-10MA	S-2MA	M-14LA
COS 75	B-MA-1	M-3MA	M-11MA	E-1LA	M-16LA
COS 76	E-1MA	M-4MA	M-12MA	E-7LA	S-1LA
COS 31	E-5MA	M-5MA	M-14MA	M-2LA	S-2LA
COS 6	E-8MA	M-6MA	M-15MA	M-5LA	

Water quality analyses shall include EPA Methods 601 and 602 or EPA method 502.2 for volatiles and semi-volatiles and EPA-approved methods for common ions and trace metals.

Respondents shall perform monitoring in three phases:

Phase A: Phase A shall begin by October 1, 1990 for all wells installed by that date. The Respondents shall incorporate subsequently completed wells into the program as each well is completed. Phase A shall continue until the beginning of Phase B.

Phase B: Phase B shall begin upon the Certification of Completion of the OU groundwater extraction and treatment system. Phase B shall continue for one year.

Phase C: Phase C shall begin one year after the beginning of Phase B. Phase C shall continue until the EPA determines that the monitoring is no longer necessary.

The monitoring schedules for each of the phases are presented in Tables 1, 2 and 3 of this Appendix. Monitoring report schedules are presented in Table 4. Monitoring (including water level measurements) required during a given month shall be completed by the 15th day of that month. The monitoring report for a given month shall be submitted to EPA by the final day of that month.

By August 1, 1990, the Respondents shall submit for EPA approval a Sampling and Analysis Plan (SAP), a QA/QC Plan and a Worker Health and Safety Plan applicable to monitoring well sampling and analysis during Phases A, B and C.

C. Pumping Data Collection

The Respondents shall identify all production wells that could have an effect on the movement of groundwater within the zone of contamination, including, at a minimum, all active production wells within the Site and within one mile of the Site boundaries with perforated intervals below the top of the MAU. The Respondents shall determine the current means of measuring flow for each of the identified wells, and shall determine the frequency and accuracy of current flow measurements. By August 1, 1990, the Respondents shall submit to EPA a report on the production wells that includes, at a minimum:

a) A map showing the production wells identified, with their appropriate well identification designation.

b) A table summarizing well identifiers, well construction details (including perforated interval), well usage (including discharge point), current flow measurement apparatus and current frequency of flow measurement.

c) A proposal of a system (including equipment or other means) for accurately measuring flow from those wells for which the current means of measuring flow is inaccurate or inadequate.

By October 1, 1990, the Respondents shall equip any extraction wells with an accurate flow measurement system as approved by EPA.

The Respondents shall compile pumpage data from the production wells identified as described above according to the following schedule:

1. By the 20th day of each month during Phases A and B
2. By the 20th day of each quarter during phase C

Pumpage data shall be included in the monitoring reports in accordance with Table 4.

D. Compilation of Salt River Flow Data

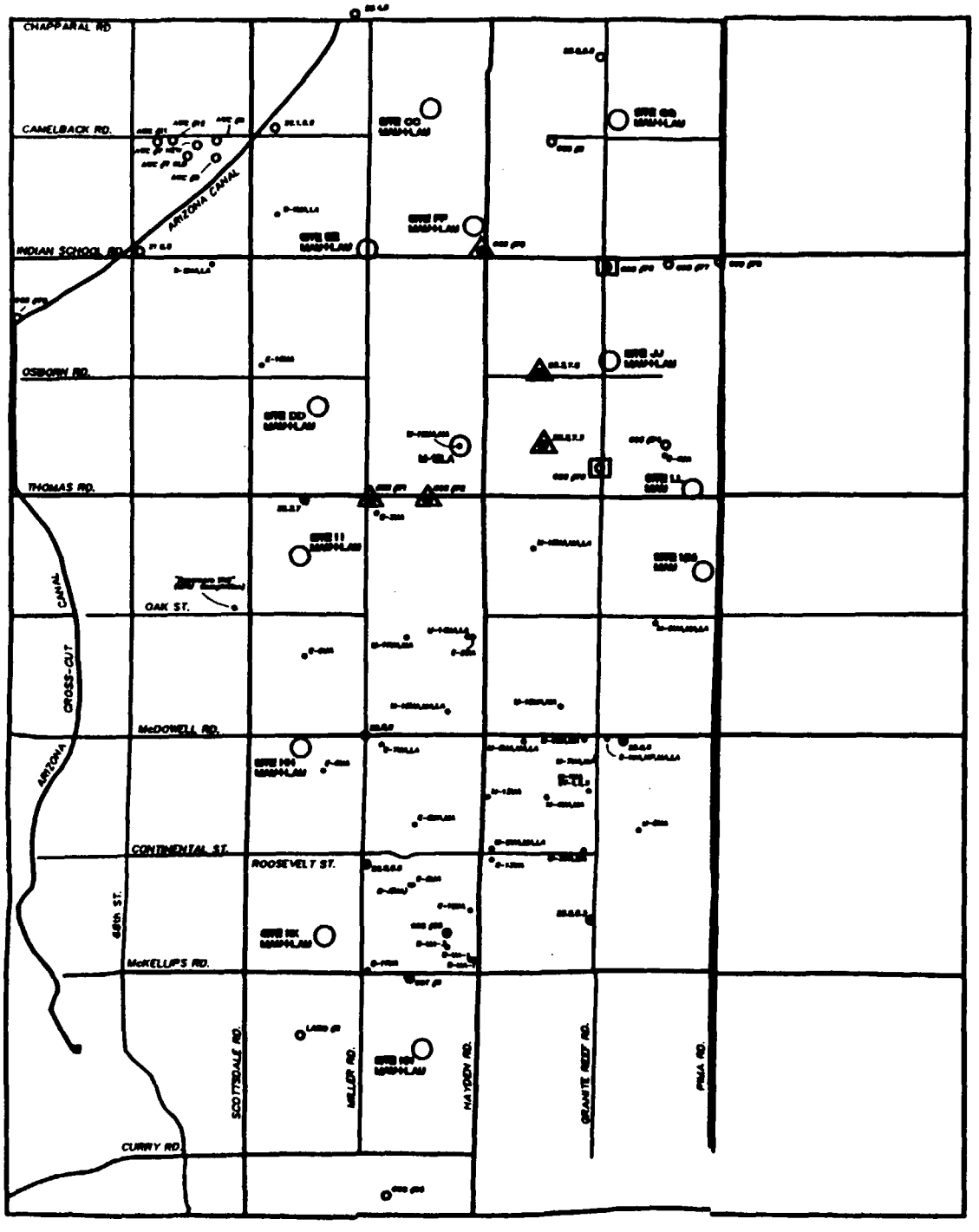
The Respondents shall compile data including all releases and inflows into the Salt River between Granite Reef Dam and the mouth of the Indian Bend Wash. The Respondents are not required to install any surface water flow measurement devices in connection with this requirement. Salt River flow data shall be compiled and included in monitoring reports consistent with the schedules for the well pumpage data.

E. Subsidence Data Collection

By March 1, 1991, the Respondents shall submit for EPA approval a plan to monitor land subsidence in the vicinity of the OU pumping center. This plan shall include, at a minimum, specifications and plans for the construction of one or more extensometers and a detailed description of leveling surveys to take place across the region on which subsidence due to OU pumping could occur.

Upon EPA approval, the Respondents shall implement the subsidence monitoring plan in accordance to the schedule set forth therein. Beginning with the first year of routine operation of the OU groundwater extraction and treatment system, Respondents shall collect land subsidence data annually. The Respondents

shall include the subsidence data, including a map showing the subsidence, with the final monitoring report for each calendar year thereafter.



EXPLANATION

- Water Supply Well No TCE Detected
- Water Supply Well TCE Has Been Detected
- Monitoring Well
- Indicates A Well To Be Pumped In The Scottsdale Operable Unit
- Indicates A Well Which May Be Optionally Pumped In The Scottsdale Operable Unit
- Final Proposed Location of Monitoring Well Site For The Scottsdale Operable Unit

ND

NORTH INDIAN BEND WASH PROJECT
MARICOPA COUNTY, ARIZONA

LOCATION OF PROPOSED WELLS FOR MONITORING THE SCOTTSDALE OPERABLE UNIT

December 6, 1989

TABLE 1

NIBW/SCOTTSDALE OU GROUNDWATER MONITORING SCHEDULE
PHASE A

MONTH:	1	2	3	4	5	6	7	8	9	10	11	12
WELL IDENTIFIER												
SCOTTSDALE OU WELLS												
COS 71	W,A,D			W,A			W,A			W,A		
COS 72	W,A,D			W,A			W,A			W,A		
COS 73	W,A,D			W,A			W,A			W,A		
COS 75	W,A,D			W,A			W,A			W,A		
COS 76	W,A,D			W,A			W,A			W,A		
COS 31	W,A,D			W,A			W,A			W,A		
COS 6	W,A,D			W,A			W,A			W,A		
EXISTING MONITOR WELLS												
E-3UA	W			W			W			W		
E-4UA	W			W			W			W		
M-12UA	W			W			W			W		
B-MA-1	W	W,A	W	W	W	W	W	W,A	W	W	W	W
E-1MA	W	W,A	W	W	W	W	W	W,A	W	W	W	W
E-5MA	W	W,A	W	W	W	W	W	W,A	W	W	W	W
E-8MA	W	W,A	W	W	W	W	W	W,A	W	W	W	W
E-10MA	W	W,A	W	W	W	W	W	W,A	W	W	W	W
M-1MA	W	W,A	W	W	W	W	W	W,A	W	W	W	W
M-2MA	W	W,A	W	W	W	W	W	W,A	W	W	W	W
M-3MA	W	W,A	W	W	W	W	W	W,A	W	W	W	W

EXPLANATION:

W = Water Level Measurement
A = Volatile Organic Compounds, EPA Method 601/602 or EPA Method 502.2
D = Common Ions, Trace Metals (EPA Approved Method)

TABLE 1 (continued)

NIBW/SCOTTSDALE OU GROUNDWATER MONITORING SCHEDULE
PHASE A

MONTH:	1	2	3	4	5	6	7	8	9	10	11	12
WELL IDENTIFIER												
EXISTING MONITOR WELLS - (continued)												
M-4MA	W	W,A	W	W	W	W	W	W,A	W	W	W	W
M-5MA	W	W,A	W	W	W	W	W	W,A	W	W	W	W
M-6MA	W	W,A	W	W	W	W	W	W,A	W	W	W	W
M-7MA	W	W,A	W	W	W	W	W	W,A	W	W	W	W
M-9MA	W	W,A	W	W	W	W	W	W,A	W	W	W	W
M-10MA	W	W,A	W	W	W	W	W	W,A	W	W	W	W
M-11MA	W	W,A	W	W	W	W	W	W,A	W	W	W	W
M-12MA	W	W,A	W	W	W	W	W	W,A	W	W	W	W
M-14MA	W	W,A	W	W	W	W	W	W,A	W	W	W	W
M-15MA	W	W,A	W	W	W	W	W	W,A	W	W	W	W
M-16MA	W	W,A	W	W	W	W	W	W,A	W	W	W	W
S-1MA	W	W,A	W	W	W	W	W	W,A	W	W	W	W
S-2MA	W	W,A	W	W	W	W	W	W,A	W	W	W	W
E-1LA	W	W,A	W	W	W	W	W	W,A	W	W	W	W
E-7LA	W	W,A	W	W	W	W	W	W,A	W	W	W	W
M-2LA	W	W,A	W	W	W	W	W	W,A	W	W	W	W
M-5LA	W	W,A	W	W	W	W	W	W,A	W	W	W	W
M-9LA	W	W,A	W	W	W	W	W	W,A	W	W	W	W
M-10LA	W	W,A	W	W	W	W	W	W,A	W	W	W	W

EXPLANATION:

W = Water Level Measurement
A = Volatile Organic Compounds, EPA Method 601/602 or EPA Method 502.2
D = Common Ions, Trace Metals (EPA Approved Method)

TABLE 1 (continued)

NIBW/SCOTTSDALE OU GROUNDWATER MONITORING SCHEDULE
PHASE A

MONTH:	1	2	3	4	5	6	7	8	9	10	11	12
WELL IDENTIFIER												
EXISTING MONITOR WELLS - (continued)												
M-14LA	W	W,A	W	W	W	W	W	W,A	W	W	W	W
M-16LA	W	W,A	W	W	W	W	W	W,A	W	W	W	W
S-1LA	W	W,A	W	W	W	W	W	W,A	W	W	W	W
S-2LA	W	W,A	W	W	W	W	W	W,A	W	W	W	W
PROPOSED MONITOR WELLS												
CC-MA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
DD-MA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
EE-MA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
FF-MA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
GG-MA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
HH-MA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
II-MA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
JJ-MA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
KK-MA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
LL-MA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
MM-MA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
NN-MA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
CC-LA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W

EXPLANATION:

W = Water Level Measurement
A = Volatile Organic Compounds, EPA Method 601/602 or EPA Method 502.2
D = Common Ions, Trace Metals (EPA Approved Method)

TABLE 1 (continued)

NIBW/SCOTTSDALE OU GROUNDWATER MONITORING SCHEDULE
PHASE A

MONTH:	1	2	3	4	5	6	7	8	9	10	11	12
WELL IDENTIFIER												
PROPOSED MONITOR WELLS - (continued)												
DD-LA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
EE-LA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
FF-LA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
GG-LA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
HH-LA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
II-LA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
M-12LA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
JJ-LA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
KK-LA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
NN-LA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W

EXPLANATION:

W = Water Level Measurement
A = Volatile Organic Compounds, EPA Method 601/602 or EPA Method 502.2
D = Common Ions, Trace Metals (EPA Approved Method)

TABLE 2

NIBW/SCOTTSDALE OU GROUNDWATER MONITORING SCHEDULE
PHASE B

MONTH:	1	2	3	4	5	6	7	8	9	10	11	12
WELL IDENTIFIER												
SCOTTSDALE OU WELLS												
COS 71	W,A,D	W,A	W,A	W,A	W,A	W,A	W,A	W,A	W,A	W,A	W,A	W,A
COS 72	W,A,D	W,A	W,A	W,A	W,A	W,A	W,A	W,A	W,A	W,A	W,A	W,A
COS 73	W,A,D	W,A	W,A	W,A	W,A	W,A	W,A	W,A	W,A	W,A	W,A	W,A
COS 75	W,A,D	W,A	W,A	W,A	W,A	W,A	W,A	W,A	W,A	W,A	W,A	W,A
COS 76	W,A,D	W,A	W,A	W,A	W,A	W,A	W,A	W,A	W,A	W,A	W,A	W,A
COS 31	W,A,D	W,A	W,A	W,A	W,A	W,A	W,A	W,A	W,A	W,A	W,A	W,A
COS 6	W,A,D	W,A	W,A	W,A	W,A	W,A	W,A	W,A	W,A	W,A	W,A	W,A
EXISTING MONITOR WELLS												
E-3UA	W		W		W		W		W		W	
E-4UA	W		W		W		W		W		W	
M-12UA	W		W		W		W		W		W	
B-MA-1	W	W,A	W	W,A	W	W,A	W	W,A	W	W,A	W	W,A
E-1MA	W	W,A	W	W,A	W	W,A	W	W,A	W	W,A	W	W,A
E-5MA	W	W,A	W	W,A	W	W,A	W	W,A	W	W,A	W	W,A
E-8MA	W	W,A	W	W,A	W	W,A	W	W,A	W	W,A	W	W,A
E-10MA	W	W,A	W	W,A	W	W,A	W	W,A	W	W,A	W	W,A
M-1MA	W	W,A	W	W,A	W	W,A	W	W,A	W	W,A	W	W,A

EXPLANATION:

W = Water Level Measurement
A = Volatile Organic Compounds, EPA Method 601/602 or EPA Method 502.2
D = Common Ions, Trace Metals (EPA Approved Method)

TABLE 2 (continued)

NIBW/SCOTTSDALE OU GROUNDWATER MONITORING SCHEDULE
PHASE B

MONTH:	1	2	3	4	5	6	7	8	9	10	11	12
WELL IDENTIFIER												
EXISTING MONITOR WELLS - (continued)												
M-2MA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
M-3MA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
M-4MA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
M-5MA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
M-6MA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
M-7MA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
M-9MA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
M-10MA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
M-11MA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
M-12MA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
M-14MA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
M-15MA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
M-16MA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
S-1MA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
S-2MA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
E-1LA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
E-7LA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
M-2LA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W

EXPLANATION:

W = Water Level Measurement
A = Volatile Organic Compounds, EPA Method 601/602 or EPA Method 502.2
D = Common Ions, Trace Metals (EPA Approved Method)

TABLE 2 (continued)

NIBW/SCOTTSDALE OU GROUNDWATER MONITORING SCHEDULE
PHASE B

MONTH:	1	2	3	4	5	6	7	8	9	10	11	12
WELL IDENTIFIER												
EXISTING MONITOR WELLS - (continued)												
M-5LA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
M-9LA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
M-10LA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
M-14LA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
M-16LA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
S-1LA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
S-2LA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
PROPOSED MONITOR WELLS												
CC-MA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
DD-MA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
EE-MA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
FF-MA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
GG-MA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
HH-MA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
II-MA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
JJ-MA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
KK-MA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W

EXPLANATION:

W = Water Level Measurement
A = Volatile Organic Compounds, EPA Method 601/602 or EPA Method 502.2
D = Common Ions, Trace Metals (EPA Approved Method)

TABLE 2 (continued)

NIBW/SCOTTSDALE OU GROUNDWATER MONITORING SCHEDULE
PHASE B

MONTH:	1	2	3	4	5	6	7	8	9	10	11	12
WELL IDENTIFIER												
PROPOSED MONITOR WELLS - (continued)												
LL-MA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
MM-MA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
NN-MA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
CC-LA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
DD-LA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
EE-LA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
FF-LA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
GG-LA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
HH-LA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
II-LA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
M-12LA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
JJ-LA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
KK-LA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W
NN-LA	W	W,A	W	W	W,A	W	W	W,A	W	W	W,A	W

EXPLANATION:

W = Water Level Measurement
A = Volatile Organic Compounds, EPA Method 601/602 or EPA Method 502.2
D = Common Ions, Trace Metals (EPA Approved Method)

TABLE 3

NIBW/SCOTTSDALE OU GROUNDWATER MONITORING SCHEDULE
PHASE C

MONTH:	1	2	3	4	5	6	7	8	9	10	11	12
WELL IDENTIFIER												
SCOTTSDALE OU WELLS												
COS 71	W,A,D		W		W		W,A		W		W	
COS 72	W,A,D		W		W		W,A		W		W	
COS 73	W,A,D		W		W		W,A		W		W	
COS 75	W,A,D		W		W		W,A		W		W	
COS 76	W,A,D		W		W		W,A		W		W	
COS 31	W,A,D		W		W		W,A		W		W	
COS 6	W,A,D		W		W		W,A		W		W	
EXISTING MONITOR WELLS												
B-MA-1	W,A		W		W		W		W		W	
E-1MA	W,A		W		W		W		W		W	
E-5MA	W,A		W		W		W		W		W	
E-8MA	W,A		W		W		W		W		W	
E-10MA	W,A		W		W		W		W		W	
M-1MA	W,A		W		W		W		W		W	
M-2MA	W,A		W		W		W		W		W	
M-3MA	W,A		W		W		W		W		W	
M-4MA	W,A		W		W		W		W		W	

EXPLANATION:

W = Water Level Measurement
A = Volatile Organic Compounds, EPA Method 601/602 or EPA Method 502.2
D = Common Ions, Trace Metals (EPA Approved Method)

TABLE 3 (continued)

NIBW/SCOTTSDALE OU GROUNDWATER MONITORING SCHEDULE
PHASE C

MONTH:	1	2	3	4	5	6	7	8	9	10	11	12
WELL IDENTIFIER												
EXISTING MONITOR WELLS - (continued)												
M-5MA	W,A		W		W		W		W		W	
M-6MA	W,A		W		W		W		W		W	
M-7MA	W,A		W		W		W		W		W	
M-9MA	W,A		W		W		W		W		W	
M-10MA	W,A		W		W		W		W		W	
M-11MA	W,A		W		W		W		W		W	
M-12MA	W,A		W		W		W		W		W	
M-14MA	W,A		W		W		W		W		W	
M-15MA	W,A		W		W		W		W		W	
M-16MA	W,A		W		W		W		W		W	
S-1MA	W,A		W		W		W		W		W	
S-2MA	W,A		W		W		W		W		W	
E-1LA	W,A		W		W		W		W		W	
E-7LA	W,A		W		W		W		W		W	
M-2LA	W,A		W		W		W		W		W	
M-5LA	W,A		W		W		W		W		W	
M-9LA	W,A		W		W		W		W		W	
M-10LA	W,A		W		W		W		W		W	
M-14LA	W,A		W		W		W		W		W	

EXPLANATION:

W = Water Level Measurement
A = Volatile Organic Compounds, EPA Method 601/602 or EPA Method 502.2
D = Common Ions, Trace Metals (EPA Approved Method)

TABLE 3 (continued)

NIBW/SCOTTSDALE OU GROUNDWATER MONITORING SCHEDULE
PHASE C

MONTH:	1	2	3	4	5	6	7	8	9	10	11	12
WELL IDENTIFIER												
EXISTING MONITOR WELLS - (continued)												
M-16LA	W,A		W		W		W		W		W	
S-1LA	W,A		W		W		W		W		W	
S-2LA	W,A		W		W		W		W		W	
PROPOSED MONITOR WELLS												
CC-MA	W,A		W		W		W		W		W	
DD-MA	W,A		W		W		W		W		W	
EE-MA	W,A		W		W		W		W		W	
FF-MA	W,A		W		W		W		W		W	
GG-MA	W,A		W		W		W		W		W	
HH-MA	W,A		W		W		W		W		W	
II-MA	W,A		W		W		W		W		W	
JJ-MA	W,A		W		W		W		W		W	
KK-MA	W,A		W		W		W		W		W	
LL-MA	W,A		W		W		W		W		W	
MM-MA	W,A		W		W		W		W		W	
NN-MA	W,A		W		W		W		W		W	
CC-LA	W,A		W		W		W		W		W	
DD-LA	W,A		W		W		W		W		W	
EE-LA	W,A		W		W		W		W		W	

EXPLANATION:

W = Water Level Measurement
A = Volatile Organic Compounds, EPA Method 601/602 or EPA Method 502.2

TABLE 3 (continued)

NIBW/SCOTTSDALE OU GROUNDWATER MONITORING SCHEDULE
PHASE C

MONTH:	1	2	3	4	5	6	7	8	9	10	11	12
WELL IDENTIFIER												
PROPOSED MONITOR WELLS - (continued)												
FF-LA	W,A		W		W		W		W		W	
GG-LA	W,A		W		W		W		W		W	
HH-LA	W,A		W		W		W		W		W	
II-LA	W,A		W		W		W		W		W	
M-12LA	W,A		W		W		W		W		W	
JJ-LA	W,A		W		W		W		W		W	
KK-LA	W,A		W		W		W		W		W	
NN-LA	W,A		W		W		W		W		W	

EXPLANATION:

W = Water Level Measurement
A = Volatile Organic Compounds, EPA Method 601/602 or EPA Method 502.2
D = Common Ions, Trace Metals (EPA Approved Method)

TABLE 4

FREQUENCY/CONTENT OF MONITORING REPORTS

MONTH:	1	2	3	4	5	6	7	8	9	10	11	12
INFORMATION TO BE INCLUDED												
WATER LEVEL DATA												
TABULATED DATA	A,B	A,B	A,B,C	A,B	A,B	A,B,C	A,B	A,B	A,B,C	A,B	A,B	A,B,C
CONTOUR MAPS (MAU & LAU)	A,B	A,B	A,B,C	A,B	A,B	A,B,C	A,B	A,B	A,B,C	A,B	A,B	A,B,C
WATER LEVEL CHANGE MAPS			B			B			B			B
HYDROGRAPHS FOR ALL MONITOR WELLS			A,B,C			A,B,C			A,B,C			A,B,C
WATER QUALITY DATA												
TABULATED DATA			A,B,C			A,B,C			A,B,C			A,B,C
LAB REPORTS AND QA/QC DATA			A,B,C			A,B,C			A,B,C			A,B,C
VOC TIME SERIES FOR MONITOR WELLS						A,B,C						A,B,C
PUMPAGE DATA												
TABULATED DATA (ALL PRODUCTION WELLS)						B						B,C
TIME SERIES (ALL PRODUCTION WELLS)						B						B,C
SALT RIVER FLOW DATA AT IBW						B						B,C
SUBSIDENCE DATA												
TABULATED												A,B,C
MAP SHOWING SUBSIDENCE												A,B,C

EXPLANATION:

A = PHASE A
B = PHASE B
C = PHASE C

TABLE 4

FREQUENCY/CONTENT OF MONITORING REPORTS

MONTH:	1	2	3	4	5	6	7	8	9	10	11	12
INFORMATION TO BE INCLUDED												
EVALUATION AND RECOMMENDATIONS												
EVALUATION OF MONITORING PROGRAM AND RECOMMENDATIONS FOR ALTERATION						A,B						A,B,C
EVALUATION OF OU OPERATION AND RECOMMENDATIONS FOR ALTERATION						B						B,C

EXPLANATION:

A = PHASE A
B = PHASE B
C = PHASE C

SUBCONTRACT DOCUMENTS

FOR

MONITORING WELL CONSTRUCTION

AT

INDIAN BEND WASH
SCOTTSDALE, ARIZONA

****

CONSISTING OF:

BIDDING REQUIREMENTS

SUBCONTRACT FORMS

CONDITIONS OF THE SUBCONTRACT

GENERAL AND TECHNICAL SPECIFICATIONS

EXHIBITS AND DRAWINGS

****

Attention: Peter Mock

CH2M HILL SOUTHEAST, INC.
9830 South 51st Street, Suite A-130
Phoenix, Arizona 85044
Phone: 602/893-6155

November 1987

Project No. W63590.FQ

Copy No._____

CONTENTS

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PART 4

SPECIFICATIONS

01001
GENERAL REQUIREMENTS
SUPERFUND

1. SPECIFICATIONS

The General Technical Specifications and Drawings included in these Subcontract Documents establish the performance and quality standards for materials, equipment, and quality of workmanship. Any questions on interpretation of, or any conflicts with, any portion of these Specifications shall be directed to and resolved by Contractor.

2. REASONABLY IMPLIED PARTS OF THE WORK SHALL BE DONE ALTHOUGH ABSENT FROM SPECIFICATIONS

Specific tasks not mentioned or completely detailed in these Specifications, that are necessary or normally required as a part of the Work described, or that are necessary or required to make each installation satisfactory or legally operable, shall be performed by the Subcontractor as incidental work without extra cost to the Contractor, as if fully detailed in these Specifications. The expense of such Work shall be included in the applicable unit prices for the Work described.

3. INQUIRIES ABOUT THE WORK

Since the site may be accessible to the general public, inquiries as to the nature of the work are a possibility. All such inquiries by individuals or news media shall be politely referred to the Contractor's representative.

4. INFORMATION ON SITE CONDITIONS

Available information regarding site conditions will be available for inspection upon request at the office of the Contractor. Such information is offered as supplementary information only. It is not the intent of CH2M HILL to fully describe or define site conditions. It is the affirmative responsibility of the Subcontractor to satisfy itself as to all site conditions. The Contractor assumes no responsibility for the accuracy or completeness or for the Subcontractor's interpretation of such supplementary information.

5. SITE ACCESS

The EPA Region IX has the responsibility to provide legal access to drilling sites. The Subcontractor has the responsibility to provide physical access to all drilling sites.

6. SUBCONTRACTOR'S RESPONSIBILITY FOR UTILITY PROPERTIES AND SERVICE

Where the Subcontractor's operations could cause damage or inconvenience to telephone, television, power, oil, gas, sewer, or water, or other utilities, the Subcontractor shall make all arrangements necessary for the identification and protection of these utilities and services.

The Subcontractor shall be solely and directly responsible to the owners and operators of such properties for any damage, injury, expense, loss, inconvenience, delay, suits, actions, or claims of any character brought because of any injuries or damage that may result from the drilling operations under the Subcontract Documents. Neither the Contractor's representative, nor its officers, or agents shall be responsible to the Subcontractor for damages as a result of the Subcontractor's failure to identify and protect utilities encountered in the Work.

In the event of interruption to domestic or other utility services as a result of accidental breakage due to drilling operations, Subcontractor shall immediately notify the proper authority. The Subcontractor shall cooperate with said authority in restoration of service as promptly as possible.

7. INTERFERING STRUCTURES

The Subcontractor shall protect any and all existing structures from damage whether or not they lie within the limits of the easements for the project. Where existing fences, gates, or any other structures must be removed to properly carry out the Work, or are damaged during the Work, they shall be restored at the Subcontractor's expense to their original condition and to the satisfaction of the property owner.

8. EASEMENTS

Where portions of the Work will be located on public or private property, easements and permits will be obtained by the EPA. Easements will provide for the use of property for drilling purposes only to the extent indicated on the easements. The Subcontractor shall confine the drilling operations to within the easement limits.

It is anticipated that all required easements and access permits will be obtained prior to the initiation of drilling. However, if the procurement of any easement or permit is delayed, the Subcontractor shall schedule its Work in such a way that operations are confined to areas where easements or permits have been obtained or are not required, until such a time as the easement or permit has been secured.

9. PERMITS

The Subcontractor shall provide all permits and licenses required by federal, state, or local agencies for drilling, construction of access roads or structures, construction of all wells or boreholes described herein, storage, transport, or disposal of all hazardous materials generated by drilling operations, or as otherwise required.

10. SITE PROTECTION

Throughout the period of construction, the Subcontractor shall keep the worksite free and clean of all rubbish and debris. Protective barriers and other safety protection necessary to protect the public and workers shall be provided by the Subcontractor. The Subcontractor shall protect all existing fences, walls, buildings, trees, and landscape during the progress of work. In the event of damage to such property, the Subcontractor shall, at his own expense, immediately restore the property to a condition equal to its original condition and to the satisfaction of the Contractor. This provision includes damage to surface and subsurface utilities. After completion of the work, the Subcontractor shall remove from the premises and work areas all materials, tools, debris, and drill cuttings from the drilling and pump installation operations. At the completion of the well, the site shall be cleared of all materials and left in a condition acceptable to the Contractor.

11. PERSONNEL PROTECTION EQUIPMENT AND SAFETY TRAINING

The Contractor will provide the Subcontractor with a Site Safety Plan (included as Exhibit A). Subcontractors shall comply with the Site Health and Safety Plan as required by the Contractor. Failure of compliance with the Site Safety Plan by the Subcontractor, as determined by the Contractor's representative, shall be considered grounds for a stop work order. Subcontractor shall remedy failure of compliance as directed and approved by the Contractor prior to resumption of Work. Subcontractor will not be paid for the time occurring after notice of a stop work order and before resumption of Work. The Contractor will monitor the Subcontractor's safety procedures for compliance with the Site Safety Plan.

All Subcontractor personnel who enter hazardous sites will be required, at a minimum, to pass an entry physical examination that meets the OSHA requirements for respirator use (29 CFR 1910.134). The Subcontractor agrees to submit to the Contractor a certification for each employee assigned to hazardous waste site field activities that said employee has been medically certified by a physician for this Work, including the use of a respirator in accordance with the provisions of 29 CFR 1910.134. Certifications of employee medical status must be submitted to

the Contractor before an employee shall be permitted to work at a hazardous waste site under the Subcontract Documents. The form of the certification will be provided by the Contractor.

All Subcontractor personnel entering a hazardous waste site, who will be exposed or have the potential for exposure to hazardous substances, will be required, at a minimum, to meet the training requirements for hazardous waste work according to 29 CFR 1910.120. Certification of employee training status must be submitted to the Contractor before an employee shall be permitted to work at a hazardous waste site under the Subcontract Documents.

Expected hazardous conditions and required clothing and respiratory equipment use are identified in these plans. A site safety meeting prior to commencement of field investigation work will be held in which site-specific training shall be provided (reimbursable at the standby rate) for appropriate numbers of Subcontractor's staff who have not already received such training. The time required for training and the number, grade, and discipline of personnel trained shall be at the Contractor's sole discretion.

12. LIMITATIONS OF CONTRACTOR'S RESPONSIBILITIES

The Contractor will not be responsible for the Subcontractor's means, methods, techniques, sequences or procedures of drilling, or the safety precautions including compliance with the Site Safety Plan, and programs incident thereto. The Contractor will not be responsible for the Subcontractor's failure to perform the Work in accordance with the Subcontract Documents.

The Contractor will not be responsible for the acts or omissions of the Subcontractor, or any lower-tier subcontractors, or any of its or their agents or employees or any other persons at the site or otherwise performing any of the Work.

13. MATERIALS AND WORKMANSHIP

The Subcontractor shall, except as specifically stated in the Subcontract Documents, provide all labor, materials, equipment, tools, and other facilities and services necessary for proper completion of all Work under the Subcontract Documents.

The Subcontractor shall guarantee that all Work will be performed in a workmanlike manner by qualified and licensed well drillers, and will conform with these Specifications.

Wherever in these Specifications the word "approved" appears, it shall be understood to mean "as approved by the Contractor or authorized representative". Where approvals are required, the Subcontractor shall keep a written signed record of those approvals and report such approvals in the daily logs.

The Subcontractor is advised that other contractors or subcontractors may be working at the site during drilling. The Subcontractor shall coordinate Work with other ongoing activities at the site.

14. SITE DESCRIPTION

The Indian Bend Wash area is predominantly residential with some light and high technology industry. The climate is arid and typical of the southwestern deserts.

15. HYDROGEOLOGIC CONDITIONS AND CONTAMINANTS PRESENT

The Indian Bend Wash study area lies in the southwestern portion of the Paradise Valley structural basin. The basin is filled with alluvium and underlain by consolidated conglomerates and crystalline basement rocks. Wells drilled under this program will not penetrate the basement complex.

The overlying alluvium within Paradise Valley is classified into three units, from depth to surface: (1) the Lower Alluvium Unit, consisting of weakly to moderately cemented alluvial fan and fluvial deposits composed of clay, silt, sand, and gravel; (2) Middle Alluvium Unit, composed of weakly cemented clays and silts and containing lenses of sand and gravel; and (3) Upper Alluvium Unit composed of unconsolidated coarse grained sand, gravel, cobbles, and boulders. (This unit is strongly cemented with caliche in some areas; localized clay lenses, which act like perching layers, may also exist within the Upper Alluvium Unit.)

The Phase I Data Summary/Report (Ecology and Environment, 1986) provides data on the Indian Bend Wash area which indicate that the water table occurred at depths of approximately 65 to 135 feet below ground surface in 1985. Groundwater in the upper Alluvium Unit (the water table unit in the area) appeared to be flowing from the southeast towards the northwest in 1985. Sediments at and above the water table appear to be Quaternary basin fill, fluvial and alluvial fan deposits of the Upper Alluvium Unit ranging in composition from clays and silts to gravels and cobbles. Preliminary sampling of groundwater from existing production and monitoring wells indicates that chloroform, 1,1,1-trichloroethane (1,1,1-TCA), 1,1-dichloroethane (DCE), trichloroethene (TCE), tetrachloroethene (PCE), and toluene are the most commonly found organic compounds in groundwater in the area (Ecology and Environment, 1986).

16. GENERAL DESCRIPTION OF WORK

The work to be performed under this Subcontract consists of drilling and developing monitoring wells, the installation of

sampling pumps, and the construction of well head pumping facilities. Three depths of monitoring wells are to be drilled: in Upper Alluvium (approximately 140 feet), to Middle Alluvium (approximately 300 feet), and to Lower Alluvium (approximately 600 feet).

The work consists of, but is not limited to, the following:

Drill boreholes to 20 feet, set and cement conductor casing.

Drill monitoring wells using the air rotary drilling method to the water table, rotary drilling of borehole for seal, installing protective casing and grout seal, drilling borehole to selected depth, and installing blank and slotted casing.

Develop monitoring wells by pumping and surging.

Conduct 12-hour aquifer test.

Construct well head structures to include a sounding tube and a housing.

Install sampling pumps.

Included in the work is decontamination, cleanup, and other elements as specified.

The wells will be constructed within the study area approximately where shown on the Drawings.

The exact location of each type of well will be determined by the Contractor.

* * * * * *

01016
SAFETY REQUIREMENTS AND PROTECTION OF PROPERTY
SUPERFUND

1. SCOPE

1.1 WORK INCLUDED: Work covered by these Subcontract Documents will be conducted in the vicinity of and on a hazardous waste site that has been placed on the EPA National Priorities List. All Work completed by the Subcontractor shall be accomplished in accordance with the Site Safety Plan as established or approved by the Contractor.

2. MATERIALS AND EQUIPMENT

2.1 GENERAL:

2.1.1 The Subcontractor agrees that each employee, while on the project site, shall wear the protective clothing and use all equipment specified in the Site Safety Plan. These requirements shall apply continuously. Refer to Section GENERAL REQUIREMENTS SUPERFUND, Paragraph 9, PROTECTION EQUIPMENT AND SAFETY TRAINING for training, equipment, and medical records required for health and safety.

2.1.2 The four levels of protection for personnel (Level A through D) range from requiring that standard safety equipment be present onsite to complete encapsulation. Because all drilling operations, onsite or offsite, have the potential for encountering contaminated conditions, Level D shall be the minimum protection allowed. To adequately protect personnel in areas of higher potential contaminant exposure, Level C protection equipment may be required. The Contractor's Site Safety Officer (SSO) will be responsible for informing the Subcontractor of the need to upgrade to Level C. A surcharge for upgrading to Level C personnel protection shall be stated in the Subcontractor's Proposal for all line items where listed. The equipment required to be either worn or carried under protection Level C is listed in Exhibit B under Site Entry Levels of Protection (EPA, 1984).

3. WORKMANSHIP

3.1 GENERAL:

3.1.1 Any hazardous site conditions shall be dealt with in accordance with safe operating practices as specified by MSHA/OSHA and the Contractor's Site Safety Plan. Safety provisions shall conform to the Federal and State Departments of Labor Occupational Safety and Health Act (OSHA); all other applicable federal, state, county, and local laws, ordinances, codes, and the requirements set forth herein; and any regulations that may be specified in other

parts of these Subcontract Documents. Where any of these are in conflict, the more stringent requirement shall be followed. The Subcontractor's failure to thoroughly familiarize himself with the aforementioned safety provisions shall not relieve him from compliance with the obligations and penalties set forth therein.

3.1.2 The Subcontractor shall develop and maintain, for the duration of this Contract, a safety program that will effectively implement all required safety provisions. The Contractor shall appoint an employee qualified to supervise and enforce compliance with the safety program. The Subcontractor, as a part of its safety program, shall maintain at the jobsite, safety equipment applicable to the Work, including articles necessary for administering first-aid to the injured, and shall establish a procedure for the immediate removal to a hospital or a doctor's care of any person (including Contractor's employee) who may be injured on the jobsite.

3.1.3 The Subcontractor shall do all work necessary to protect the general public from hazards including, but not limited to, open boreholes, water sumps, and trenches or excavation. Barricades, lanterns, and proper signs shall be furnished in sufficient amount to safeguard the public and the Work. During well construction, the Subcontractor shall construct and at all times maintain satisfactory and substantial temporary chain link fencing, solid fencing, railing, barricades or steel plates, as applicable, at all pits, sumps, trenches, or ditches. All such barriers shall have adequate warning lights as necessary, or required, for safety.

3.1.4 The Contractor and authorized government agents, and their representatives, shall at all times be provided safe access to the Work wherever it is in progress, and the Subcontractor shall provide facilities for such access and for inspection.

4. PAYMENT

4.1 GENERAL:

4.1.1 Payment for materials, equipment, and work necessary to provide protection for Level D contamination shall be included in the Subcontractor's Bids for the various items of the Contract.

4.1.2 Payment for materials, equipment, and work required to provide protection to contaminant Level C will be made at the unit price for Level C personnel protection as stated in the Subcontractor's Bid for LEVEL C PROTECTION. This payment will be in addition to the prices bid for the various items of the Contract. Hours will be measured for the actual time the work is actively performed under Level C conditions, including decontamination and cleanup.

4.1.3 Equipment required, but not listed on the Subcontractor's Bid, shall be considered incidental to performance of Work. No additional payment will be made.

* * * * * *

01722
DECONTAMINATION OF PERSONNEL AND EQUIPMENT

1. SCOPE

1.1 WORK INCLUDED: This section covers the labor, materials, and equipment necessary for decontaminating all personnel, sampling, and analysis equipment, complete. All equipment shall be cleaned before proceeding to the next location.

1.2 GENERAL:

1.2.1 All equipment shall be washed and cleaned as approved by the Site Engineer prior to initiation of work at each well site. This includes drilling rigs, pipe, pumps, and any other equipment brought onsite. This is done to prevent cross-contamination between locations and contamination of any material being placed into the ground.

1.2.2 If the soil is discolored or other evidence indicates contamination, the subcontractors shall perform decontamination as required to protect personnel and prevent contamination of other areas. Subcontractor is responsible for detecting contamination; however, the Contractor, in his sole discretion, may determine that a condition is contaminated and direct the subcontractor to take remedial steps. The minimum procedures to be taken are as follows:

1.2.2.1 An onsite decontamination pad and station will be supplied by the Subcontractor. The decontamination station will provide a place for the containment of all fluids used in the decontamination procedure.

1.2.2.2 All personnel shall be decontaminated before leaving the site if contamination is observed or measured by the Site Engineer, as specified in the Contractor's Site Safety Plan.

1.2.2.3 Between each location all equipment used in sampling shall be decontaminated.

1.2.2.4 Upon completion of work at a site, all equipment shall be decontaminated before leaving the site as approved by the Contractor.

2. MATERIALS AND EQUIPMENT

2.1 GENERAL:

2.1.1 The Subcontractor shall provide all equipment necessary for the decontamination process such as trisodium phosphate, hot water high pressure washer, buckets, brushes, etc.

2.1.2 Subcontractor shall provide United States Department of Transportation (U.S. DOT)-approved containers having 55-gallon capacity and sealable, watertight lids as required. Labeling materials shall also be supplied by the Subcontractor.

3. WORKMANSHIP

3.1 GENERAL: The Subcontractor shall follow the general decontamination plans, as specified by the Contractor in the Site Health and Safety Plan. Prior to mobilization, the Subcontractor will finalize all personnel decontamination needs, equipment, and procedures with the Contractor. If decontamination becomes necessary, the Subcontractor shall supply a decontamination station, satisfying Level C requirements and equipped with a means of catching all water.

4. PAYMENT

4.1 GENERAL:

4.1.1 Payment for decontamination of equipment and personnel shall be made at the unit price per hour as stated in the Subcontractor's Bid for DECONTAMINATION OF PERSONNEL AND EQUIPMENT. Payment at this unit price per hour shall constitute full compensation for all work covered under this section.

4.1.2 Payment for containerizing solid and liquid wastes in the 55-gallon drums, which includes supplying the drums, shall be compensated at the unit price per drum as specified in the Subcontractor's Bid for HAULING DRILLING WASTES.

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02580
MOBILIZATION AND CLEANUP
SUPERFUND

1. SCOPE

1.1 WORK INCLUDED: This section covers the work necessary to transport to and from each site all personnel and equipment, set up and remove equipment and temporary facilities, and clean up each location, complete. This includes cleaning of all equipment prior to initiating work, between locations, and following completion of work.

2. MATERIALS AND EQUIPMENT

2.1 GENERAL:

2.1.1 Provide all materials and equipment required to accomplish the work as specified.

2.1.2 On all questions concerning the acceptability of materials, machinery, execution of work, and determination of costs, the decision of the Contractor's Site Engineer shall be final and binding upon all parties.

2.1.3 The Subcontractor shall assume full responsibility for all supplies, materials, and equipment required by him for the contracted work, whether furnished by him or by other parties. The Subcontractor shall be solely responsible for any loss or damage to all supplies, materials, and equipment while stored at the work site.

3. WORKMANSHIP

3.1 GENERAL:

3.1.1 Arrange schedule with the Contractor at least 5 days prior to initiation of work. Clean all equipment and tools under supervision of Site Engineer prior to mobilization onsite. Set up equipment at locations designated by Site Engineer. Approximate areas of work are shown on the Drawings. Final locations will be determined in the field by the Site Engineer prior to and during mobilization. Accomplish all required work in accordance with applicable portions of these Specifications or as approved by the Site Engineer.

3.1.2 Some obstructions may not be shown on the site plan. The Subcontractor is advised to carefully inspect the existing facilities before beginning any work at the site. Relocation adjacent to obstructions shall be anticipated and accomplished, even though not shown or specifically mentioned.

3.1.3 The Contractor accepts no liability for costs incurred due to Subcontractor's failure to thoroughly examine the site and review existing site plans, data, and these Specifications.

3.2 DISPOSAL OF MATERIAL: The Subcontractor shall make arrangements for the disposal of all waste material including drilling cuttings, spent drilling fluids, water, and all other items. Materials shall be disposed of in accordance with all local, state, and federal requirements. Contaminated wastes shall be disposed of in accordance with Section DECONTAMINATION OF PERSONNEL AND EQUIPMENT.

3.3 CLEANUP OF CONSTRUCTION AREAS:

3.3.1 Avoid contamination of the project area. Do not dump waste oil, rubbish, or other materials on the ground. Restore site, as nearly as possible, to original condition as determined by the Site Engineer.

3.3.2 Upon completion and acceptance of the work at each location, remove from the site all equipment, unused materials, temporary facilities, and other miscellaneous items resulting from or used in the operations. Replace or repair any facility damaged during the work. Site cleanup shall be completed to the satisfaction of the Site Engineer.

3.3.3 Upon leaving the site at the completion of work, the Subcontractor shall clean and decontaminate the tools in accordance with Section DECONTAMINATION OF PERSONNEL AND EQUIPMENT. Contaminated solid and liquid waste from the final decontamination shall be disposed of as specified therein.

3.4 SPOILS DISPOSAL:

3.4.1 The Contractor shall sample and provide laboratory analysis of the contents of the spoils drums and shall classify each drum as hazardous or nonhazardous.

3.4.2 The Subcontractor shall spread the contents of drums classified as nonhazardous at locations and in a manner as directed by the Site Engineer.

3.4.3 Upon notification by the Contractor, the Subcontractor shall dispose of contents of drums classified as hazardous at a RCRA-approved hazardous waste treatment, storage, or disposal facility in accordance with all federal, state, and local hazardous waste regulations. The Subcontractor shall obtain all permits and pay all fees to accomplish this work. EPA will be the generator of such hazardous wastes and will sign manifests.

3.4.4 Subcontractor shall submit with its bid the name, address, telephone number, transport or disposal license number, and name of a contact person for the proposed waste hauler and disposal site.

4. PAYMENT

4.1 GENERAL:

4.1.1 Work for mobilization and cleanup will be paid for at the unit price bid each for the number of distinct sites actually drilled. For the purpose of payment, a site is defined as a drilling location that requires a distinct breakdown and movement of equipment and facilities and has definite setup and cleanup phases. A site may have one or more monitoring wells. The unit price will constitute full payment for furnishing all materials and equipment and performing all work including locating of existing utilities, setup and removal of equipment, cleanup, and all other related work.

4.1.2 Per diem will be paid for at the unit price bid per crew day for the actual days of operation. Measurement will be made to the nearest whole day. Per diem will be paid only if the crew is more than 50 miles from their equipment yard and will constitute full payment for all meals, lodging, and personal transportation while working at the site. Payment will not be made for time in which work is not being performed because of defective or broken equipment, lack of supplies, or other similar causes that are within the Subcontractor's control.

4.1.3 Standby time will be paid for at the unit price bid per crew hour for any portion of the working day in which the Contractor orders work to cease. Measurement will be to the nearest hour. Payment will constitute full payment for all labor, equipment, fuel, and other similar items. Per diem will be paid in addition to standby time when applicable.

4.1.4 Work for the disposal of drilling wastes will be paid at the unit price stated in the Bid for drums classified as hazardous or nonhazardous wastes.

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02602
MONITORING WELL DRILLING AND DEVELOPMENT

1. SCOPE

1.1 WORK INCLUDED: This section covers the work necessary to drill and develop the monitoring wells, including decontaminating equipment, installation of conductor casing, construction of outer protective casing with grout seal, drilling boreholes, geophysical logging of open boreholes and installing blank and slotted inner casing, developing wells by pumping and surging, and all other related work.

1.2 PERMITS: The Subcontractor shall obtain permits to drill the wells and hydrologic testing permits from the Arizona Department of Water Resources. Groundwater withdrawal permits or exemptions will be secured from the Department of Water Resources by the Subcontractor.

2. MATERIALS

2.1 DRILLING FLUID: Drilling fluids, if required, shall be only high-grade approved commercial clays, commercial clay products commonly used in the area for water well drilling, or approved drilling additives. The drilling fluid shall possess such characteristics as are required to adequately maintain the walls of the borehole, to prevent caving of the walls as drilling progresses, and to permit recovery of representative samples of drill cuttings. The use of bentonite, clay, mud, or other foreign matter that has a tendency to build a mud cake on the walls of the hole and clog or seal up the water-bearing stratum will not be permitted without prior approval of the Contractor. Casings shall be rotated and reciprocated while flushing the borehole with water to remove the mud cakes and embedded cuttings. The Subcontractor shall remove any residual mud cake on the borehole wall during development of the well. Analysis of all proposed drilling additives for volatile organic compounds (EPA Method 601) is required.

2.2 CONDUCTOR AND PROTECTIVE CASINGS: Conductor and protective casings shall be Schedule 20 steel pipe in accordance with ASTM A 53 Grade B or A 139 Grade B steel.

2.3 GROUT SEAL: Grout seal shall consist of a neat cement slurry composed of 6 gallons of water to each 94-pound sack of Type II portland cement with a water ratio of 14.5 to 15.0 pounds solids per gallon of water. The density of the slurry mixture shall be monitored prior to placement and in the return flow at land surface using a standard mud balance. A record will be kept of all such measurements. The time between mixing and placement and the total volume of slurry emplaced shall also be recorded.

2.4 STEEL CASING: Steel casing shall be Schedule 20 steel pipe with flush coupled threads or welded joints. Casing centralizers shall be installed every 40 feet or as directed by the Contractor. Centralizers shall be attached with screw-tightened tension clamps or spot welded. Glues and solvents shall not be used to attach the centralizers.

2.5 SLOTTED CASING: Slotted casing shall be Schedule 20 steel pipe with flush coupled threads or welded joints, factory slotted with 1/8-inch by 3-inch sawcut slots, six slots per round and two rows per foot with alternate rows staggered. No bottom cap shall be used. Centralizers shall be installed every 20 feet or as directed by the Contractor. Slot opening may be modified by the Contractor.

3. WORKMANSHIP

3.1 GENERAL: The final depth of each well will be determined by the Contractor based on results of drilling boreholes, existing wells, and other data. The borehole and casing sizes and the approximate depth of the monitoring wells are shown on the Drawings. Stabilizers or drill collars should be used to increase weight on the drill bit in order to advance drilling in cobbles or other hard materials and to maintain a vertical hole. Mechanical pulldown capability and a hoisting capacity of 75,000 pounds is required. A portable mud mixing container and a portable cutting separating tank shall be used during drilling. A grout injection pump with capacity of 300 gallons per minute at 600 pounds per square inch is required. The Subcontractor shall be aware of hole depth at all times and shall inform Contractor's personnel of the same upon request. The Subcontractor shall also be responsible for maintaining a vertical hole alignment not to vary from the vertical more than two-thirds the inside diameter of the well per 100 feet of hole. The driller shall maintain and file all necessary well logs as required by state or local regulations within 1 week of completing well. Each well shall be completed with installed vault before moving the rig to the next wellsite.

3.2 WELL DRILLING:

3.2.1 The boreholes shall be drilled using air rotary techniques in the Upper Alluvium Unit unsaturated zone and, if possible, into the saturated zone. However, mud rotary can be used if air rotary is not possible. The Contractor, in consultation with the driller, will determine when mud rotary is to be used. Drilling additives can be used to stabilize the borehole only after approval by the Contractor.

3.2.2 Drill and install 20 feet of conductor casing for each well as indicated on the Drawings.

3.2.3 For middle and lower alluvium wells, drill the borehole for the outer seal and protective casing to the depth determined by the

Contractor. An estimate of the expected depth is indicated on the Drawings. Set the protective casing in place and grout by injecting the grout from the bottom of the casing up the outside annulus until grout is observed flowing at the surface. A cementing head, which will prevent the introduction of air into the protective casing during the cementing procedure, shall be used. As the slurry flows up the annulus, the casing shall be rotated and reciprocated to minimize the development of channels behind the casing. The slurry should be displaced with a calculated casing volume of water to prevent over-pumping, slurry dilution, or lack of cement at the base of the protective casing. Grout must set 24 hours before drilling can resume. Any fallback in the grout seal shall be brought to the estimated base of the vault before conducting further operations.

3.2.4 Drill borehole for casings for all wells to the depth directed by the Contractor. Install blank and slotted casings.

3.2.5 Collect and seal all drill spoils and water in approved U.S. Department of Transportation drums. Transport drums to a staging area designated by the Site Engineer. The staging area will be within an average road distance of 5 miles from the well sites.

3.3 WELL DEVELOPMENT: All completed wells shall be developed by either pump surging, air lifting, or jetting techniques depending on hole depth and physical conditions. Air for airlift development shall be filtered to remove hydrocarbons prior to use. During pump surging, a pump without a check valve shall be used such that a surging action can be achieved with backflowing water. Pumping or air lifting should be able to achieve 20 gpm from the screened area. Development water may be discharged to the surface, storm drain, sewer, as approved by the Contractor. Development shall continue for at least 2 hours. The Contractor will determine when discharge can be released to the surface and when proper development has been accomplished.

3.4 AQUIFER TESTS: Prior to the installation of permanent pumps, short-term aquifer tests shall be conducted at each well. Pumping rate shall be controlled with an appropriate valve and measured with an in-line totalizing flowmeter. The Subcontractor shall supply, install, and operate a pump in order to perform short-term (12 hours) aquifer tests and recovery tests. The pump shall be capable of pumping 10 to 50 gallons per minute to the surface from the estimated level of the water in the aquifer. Aquifers are assumed to be isolated. Discharge shall be measured using an inline Pitot tube. Water samples will be collected throughout the pumping test by the Contractor. If the pump fails during the test, the test shall be repeated at the Subcontractor's expense. Water levels must be allowed to recover before a second test is initiated. The Subcontractor shall provide piping to conduct all production waters to the proper disposal point as directed by the Contractor.

3.5 DRILLING LOG: As the drilling proceeds, the driller shall keep a log of the borehole which carefully and accurately describes the materials penetrated. The log shall show all changes in strata and such information as drilling rate, depth at which water is first encountered, and other pertinent phenomena observed during drilling of the borehole. A record shall be kept of any variation in the addition and amount of approved clays or chemical products or water required during drilling. The depth at which such changes are required shall be shown in the daily reports.

3.6 SAMPLE COLLECTION: At each change in strata or at least every five feet, the Subcontractor shall collect a large, representative sample of the interval or new strata. The Subcontractor shall label and store each sample in a suitable quart-sized, waterproof container. The sample containers shall be stored in a manner to prevent breakage or loss. All containers shall be furnished by the Subcontractor.

3.6.1 SIEVE ANALYSIS: The Subcontractor shall determine the grain size distribution of at least five samples per well selected by the Contractor. Data required from the sieve analyses are the cumulative percent retained by each sieve of a particular screen size opening.

3.7 GEOPHYSICAL LOGGING:

3.7.1 The Subcontractor shall make a geophysical log of the outer and inner casing boreholes. All logging should utilize a Compulog, or other computer based data acquisition system, so that raw data can be permanently stored on magnetic tapes. The driller shall be responsible for submitting all geophysical logs to the Contractor after each run. A magnetic tape of the raw data or floppy disks containing the digitized logs shall be submitted to the Contractor after the project is complete. The Contractor shall retain original copies of all logs.

3.7.2 Logs to be conducted shall include:

A. Gradient Temperature Log (which will be run first)

B. Resistivity Logs: These will include 16-inch normal, 64-inch normal, and single-point resistivity logs.

C. Spontaneous Potential (SP) Logs

D. Natural Gamma Log: A thallium-activated sodium iodide detector can be used to detect gamma radiation.

E. Caliper Log

3.7.3 The borehole shall be logged through standing fluid from the base of the borehole to the surface, unless determined otherwise by

the Contractor. Ground surface shall be designated as zero elevation.

4. PAYMENT

4.1 Work for installing conductor and outer steel casings will be paid for at the unit price bid per foot of acceptable casing actually installed. The unit price will constitute full payment for furnishing all materials and equipment and performing all work, including drilling outer borehole, installing casing and grout sealing, and all related work.

4.2 Work for installing inner casing within an outer casing will be paid for at the unit price bid per foot of acceptable casing actually installed. The unit price will constitute full payment for furnishing all materials and equipment and performing all work including drilling inner borehole, installing casing, and all related work.

4.3 Work for installing inner casing will be paid for at the unit price bid per foot of acceptable casing actually installed. The unit price will constitute full payment for furnishing all materials and equipment and performing all work, including drilling borehole, installing casing, and all related work.

4.4 Work for installing slotted casing will be paid for at the unit price bid per foot of acceptable screen actually installed. The unit price will constitute full payment for furnishing all materials and equipment and performing all work, including drilling borehole, installing slotted casing, and all related work.

4.5 Work for developing well will be paid for at the unit price bid per hour. The unit price will constitute full payment for furnishing all materials and equipment and performing all work, including furnishing and operating test pump, bailing sediment from well, disposing of water and wastes, and all other related work.

4.6 Work for aquifer testing will be paid for at the unit price bid per hour. The unit price will constitute full payment for furnishing all materials and equipment and performing all work, including furnishing and operating pump, disposing of water and wastes, and all other related work.

4.7 Work for geophysical logging will be paid for at the unit price bid per foot. The unit price will constitute full payment for furnishing all materials and equipment and performing all work to conduct all logging as specified.

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02603
WELL COMPLETION

1. SCOPE

1.1 WORK INCLUDED: This section covers the work necessary to construct the well head and access boxes, install the pumps, and perform other related work.

2. MATERIALS

2.1 PUMP: Pump shall be a 4-inch all stainless steel submersible multistage centrifugal pump with water-cooled submersible motor, built-in check valve, and screen. Motor starting devices such as starting capacitor, capacitor relays, etc., shall be contained in an abovegrade control box with a NEMA 3R enclosure. Included in the control box shall be starting winding and running winding overload protection. Pump shall be rated for 10 gpm at 250 feet pump discharge head at 3,450 rpm. Motor shall be three-quarter horsepower minimum, 60 Hz, 230-volt, single-phase, 3,600 rpm nominal speed. Motor shall be nonoverloading at all points on the pump operating curve. Provide pump performance curves showing flow, head, horsepower, and pump efficiency over entire operating range. Pump shall be Grundfos SP 2-15 or equal.

2.2 COLUMN PIPING: Column piping shall be 1-inch Schedule 40 galvanized steel pipe in accordance with ASTM A 53, Grade B. Joints shall be threaded coupling using Teflon tape.

2.3 CONCRETE: Concrete shall be ready-mixed conforming to ASTM C 94, 3/4-inch maximum aggregate size, 3,000 psi minimum, 28-day strength, with a 2- to 4-inch slump, and a minimum of 517 pounds of cement per cubic yard.

2.4 SOUNDING PIPE: Sounding pipe shall be 3/4-inch Schedule 80 PVC pipe in accordance with ASTM D 1785 or Schedule 40 galvanized steel pipe in accordance with ASTM A 53, Grade B. Threaded PVC couplings shall be in accordance with ASTM D 2466. Sounding pipe shall have 1/8-inch holes drilled every foot in the lower 10 feet.

2.5 PADLOCKS: Furnish one lock for each access vault. Locks shall be heavy duty with forged brass case 7/16-inch hardened shackle, bolted toe and heel, of the combination type.

2.6 MOTOR STARTER LEADS: Provide motor starter leads, as shown on the Drawings, complete with twist lock receptacle plugs and starter.

3. WORKMANSHIP

3.1 GENERAL: The setting depth of the pump shall be determined in the field by the Contractor based on the depth to groundwater, the screen setting depth, and other considerations.

3.2 PUMP INSTALLATION: Install pump in accordance with the pump manufacturer's instruction to the depth determined by the Contractor. Fasten power drop cable to the column with nylon cable clips or waterproof tape at 10-foot intervals.

3.3 WELL HEAD AND ACCESS BOXES: Construct well head and access boxes as shown on the Drawings. All electrical work shall be in accordance with the National Electric Code and local ordinances. Install grounding rod as shown, and ground both pump lead and protective casing to the ground rod. When completed, each pump shall be operable with one type of electrical connection.

3.4 TESTING: Each pump installation shall be tested by the Subcontractor to demonstrate satisfactory operation. Subcontractor shall provide a portable generator, flowmeter, ampere meter, hose, well level sounding probe, and other equipment as required to test the pump. If the pump fails to satisfactorily pass the test, either from flow rate, power requirements, or other reasons, the Subcontractor shall perform all work to correct the deficiency at no additional cost to the Contractor.

4. PAYMENT

4.1 Work for constructing well head and belowgrade access box will be paid for at the unit price bid each for the number of belowgrade well heads constructed. The unit price will constitute full payment for furnishing all materials and equipment and performing all work, including constructing the well head, the buried box, slab and cover, and all other related work.

4.2 Payment for the sampling pump, column pipe, electrical work, and testing shall be included in the unit price bid for the 4-inch inner casing, as applicable.

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PART 5

EXHIBITS AND DRAWINGS

Exhibit A

CH2M HILL

SITE SAFETY PLAN FOR FIELD INVESTIGATIONS

I. GENERAL INFORMATION

CLIENT: U.S. EPA JOB NO: W63590.FK
PROJECT MANAGER: John D. Lucero
SITE: INDIAN BEND WASH, ARIZONA
SITE LOCATION: 13 SQUARE MILE AREA, ENCOMPASSING PORTIONS OF SCOTTSDALE AND TEMPE, ARIZONA
PURPOSE OF FIELD VISIT(S): MONITORING WELL INSTALLATION GROUNDWATER SAMPLING

DATE OF VISIT(S): December 1987 through April 1988
BACKGROUND INFORMATION: Complete X Preliminary
INFORMATION AVAILABLE FROM: SFO, RDD, PHX (office)
OVERALL HAZARD SUMMARY: Serious Moderate
Low X Unknown

II. SITE/WASTE CHARACTERISTICS

FACILITY DESCRIPTION

The Indian Bend Wash study area encompasses 13 square miles in portions of Scottsdale and Tempe, Arizona in the southwestern portion of Paradise Valley. Most of the area is urbanized and the groundwater basin is heavily used. Two general areas of contaminated groundwater have been tentatively identified: one north of the Salt River and another south of and adjacent to the Salt River.

The onsite activities will consist of installation of monitoring wells using mud-rotary or dual-tube air percussion techniques. The monitoring wells will be installed to depths ranging from 150 to 800 feet.

Principal Disposal Method (type and location):

Evaporation lagoons and possible dry wells at several industrial sites.

Features and Unusual Features (water supply, telephone, radio, power lines, gas lines, watermains, terrain, etc.):

No unusual features are evident. Because of the urban nature of the setting, utilities may be present at specific investigative sites.

Status (active, inactive, unknown): Active

History (worker or non-worker injury; complaints from public; previous agency action):

A wide range of sampling has occurred over the past three years at the site: sixteen monitoring wells have been installed at an industrial site; and 20 monitoring wells were installed during the first phase of the RI. The Arizona Department of Environmental Quality has ordered closure or appropriate blending of municipal supply wells providing water to the public.

WASTE TYPE(S)

Liquid__X__ Solid_____ Sludge_____ Gas_____

CHARACTERISTIC(S)

Corrosive_____ Ignitable_____ Radioactive_____
Volatile__X__ Toxic__X__ Reactive____ Unknown___ Other (Name)___

HAZARD EVALUATION

The waste material consists of groundwater contaminated with low levels of trichloroethylene (TCE), perchloroethylene (PCE), dichloroethylene, trichloroethane and chloroform in the parts per billion range. Maximum detected concentrations are generally less than 1,500 ppb for each of the hydrocarbons.

The primary avenue of exposure is inhalation and skin contact. TCE is a central nervous system depressant that produces visual disturbances, mental confusion, fatigue and nausea. The threshold limit value (TLV) for TCE is 50 ppm. PCE is also a central nervous system depressant with initial symptoms of eye, nose, and throat irritation. The TLV for PCE is 50 ppm. Care must be taken to avoid dermal contact as well as inhalation of volatiles.

Activities will be conducted around operating pumps, electrical lines, and pressurized water lines which are associated with water well activities. Dealing with normal industrial accident potentials (i.e., tripping hazards, operating pumps and electrical motors, electrical hazards, etc.) is of concern during site sampling activities.

III. SITE SAFETY WORK PLAN

PERIMETER ESTABLISHMENT

Because of the nature of the site, a perimeter map is not attached. Locations for monitoring well installation and groundwater sampling will be identified on area maps as the tasks are initiated.

SITE PERSONNEL

Level of Protection:

A _____ B _____ C _____ D __X__

Modifications:

Hard hat, steel-toed, steel shank safety shoes or boots, latex gloves, safety glasses and cotton coveralls. Level C equipment will be required if monitoring with an HNu shows volatile organic levels above the action level. Level C would include Tyvek coveralls, N10SH/MSHA approved air purifying respirators with approved combination acid gas, organic vapor, and dust filter cartridges, and butyl gloves.

Equipment and Materials: TLD badge, first aid kit, eye wash kit, A, B, C 20 lb fire extinguisher, stretcher, potable water container wind indicator.

Monitoring:

Monitoring with an HNu (10.2 ev probe) will be maintained during all field activities involving monitoring well installation and sample collection. The action level for upgrading to Level C protection is a continuous HNu reading or 5 ppm above background.

General Safe Work Practices:

a. No eating, drinking, or smoking in any areas designated as contaminated.

b. Hands and face must be thoroughly washed immediately upon leaving a contaminated zone.

c. As soon as is practical, full shower must be taken after leaving the site.

d. No facial hair which might interfere with a satisfactory respirator-to-skin seal is allowed.

e. Contact lenses are not permitted on any site and if a respirator will be worn and corrective lenses are needed to achieve at least 20/40 vision, then prescription lenses mounted in a respirator spectacle kit is required.

f. Safety glasses or approved chemical splash goggles are required onsite whenever a respirator is not worn.

Team Member	Responsibility
John Lucero	Project Manager/Site Safety Coordinator[1]
Fritz Carlson	Senior Hydrogeologist[1]
Peter Mock	Hydrogeologist[2]

[1]Periodic observation of field activities (<1 day/wk)

[2]Regular observation of field activities (2-3 days/wk)

SITE ENTRY PROCEDURES

Site entry procedures will be established on a case by case basis. Field activities will be coordinated with site operations personnel prior to entry. Prior to working onsite, an inspection for hazards will be made.

WORK LIMITATIONS (Time of day, etc.)

Work will be done during daylight hours only.

HEAT STRESS

Heat stress in the field is a hazard when protective clothing is worn during warm temperatures. The site safety coordinator will implement heat stress prevention techniques when temperatures are above 75°F. Prevention techniques include: a work-rest regimen to limit the protective gear wearing time in-between rest periods; planning of the work schedule to avoid the warmest time of the day; frequent fluid replenishment; heart rate monitoring; and provisions for shaded rest areas.

DECONTAMINATION PROCEDURES

Personnel Decontamination:

Personnel decontamination procedures will be performed at each location prior to leaving the study area.

The following personnel decontamination procedures will be followed:

a. Remove disposable booties (if used) and place in plastic bag for disposal.

b. Wash neoprene boots with detergent solution and rinse with clean water. Remove boots and retain for subsequent reuse.

c. Wash outer gloves in detergent solution and rinse in clean water. Remove outer gloves and place into plastic bag for disposal or retain for subsequent reuse.

d. Remove Tyvek coveralls. Take care to prevent the release and dispersion of dusts which may have accumulated on the coveralls during onsite operations and place overalls into a disposable plastic bag.

e. Remove the respirator (if used) and place spent filters into the plastic bag destined for disposal. Place the respirator onto a reusable table or into a separate plastic bag for later cleaning and disinfection. The respirator must be disinfected nightly using MSA disinfectant.

f. Remove surgeon's gloves.

g. Thoroughly wash hands and face.

h. Place all independent disposable bags that were not onsite into one larger bag. If high concentrations are indicated, disposable items that were onsite will be placed in a 55-gallon drum with other solid wastes for eventual disposal by the EPA.

DOCUMENTATION

The Site Safety Coordinator or designee will document in the field log notebook:

- o HNu readings (including location and time).
- o Level of protection worn by workers.
- o Health and Safety equipment calibrations made.
- o Weather and site conditions such as estimated temperature, wind direction, precipitation, dust.
- o Decontamination of equipment.
- o Disposal method of contaminated items.
- o Unusual events or conditions.
- o Accidents, injuries, or exposures.

IV. EMERGENCY INFORMATION

If an injury occurs onsite, take the following action:

- o Get medical attention for the injured person immediately.
- o Depending on the type and severity of the injury, notify the occupational physician for the injured person.

- o Notify Mary Anne Chillingworth or John Hochstrasser.

- o Notify Sharon Robinson (corporate personnel department).

- o Write down all circumstances surrounding the incident which caused the injury, including, but not limited to, time of day, working conditions (weather, etc.), how long it had been since the last rest period when the injury occurred, what the person was doing when injured, what all other personnel onsite were doing, what level of protection was being used, if all safety procedures were being followed, etc. All team members that witnessed the incident should write down their recollection of the incident, give it to the site safety coordinator who shall then write up an exposure report. This exposure report needs to be sent to Sharon Robinson/CVO and Mary Anne Chillingworth/WDC.

LOCAL

Ambulance: 911

Hospital: Scottsdale Memorial, 602/994-9616

Poison Control Center: Good Samaritan Hospital, 602/253-3334

Police/Sheriff: Scottsdale: 602/946-6511 Tempe: 602/966-6211

Fire: Scottsdale: 911 Tempe: 911

Electric Co.: Arizona Public Service: 602/271-7171
Salt River Project: 602/236-8888

Gas Co.: Southwest Gas Corp: 602/942-0888

Water Co.: City of Phoenix Water: 602/262-6251
City of Scottsdale Water: 602/994-2461
City of Tempe Water: 602/968-8351

Airport: Phoenix Sky Harbor International Airport, 602/262-6291

Explosives Unit: Same as police

EMERGENCY ROUTES

Scottsdale Memorial Hospital on Osborn Road between Scottsdale Road and Miller Road

Good Samaritan Hospital at intersection of McDowell and 7th Street

HOSPITAL

Good Samaritan Hospital at intersection of McDowell and 7th Street

EMERGENCY CONTACTS

1. Corporate Consulting Physician
   Dr. Kenneth Chase
   202/463-6698 (9-5 working hours)
   202/ (24-hour answering service)

2. Mary Anne Chillingworth/WDC, REM IV Health and Safety Manager
   Phone: 703-471-1441 (O)
   703-476-0882 (H)

3. Occupational Physician
   Name: Dr. Cucuiat
   Phone: 818/891-5741
   Address: Occupational Medical Center of America
   8660 Sepulveda Avenue
   Sepulveda, CA 91343

   Team members under his care:

   Peter Mock

   Occupational Physician
   Name: Dr. Everett D. Trevor
   Phone: 916/246-4180
   Address: 2656 Edith Avenue
   Redding, CA 96001

   Team members under his care:

   Fritz Carlson
   Jeff Morris

4. Project Manager
   Name: John D. Lucero
   Phone: 303/771-0900

5. Client Contact
   Name: Jeff Rosenbloom
   Phone: 419/974-7513

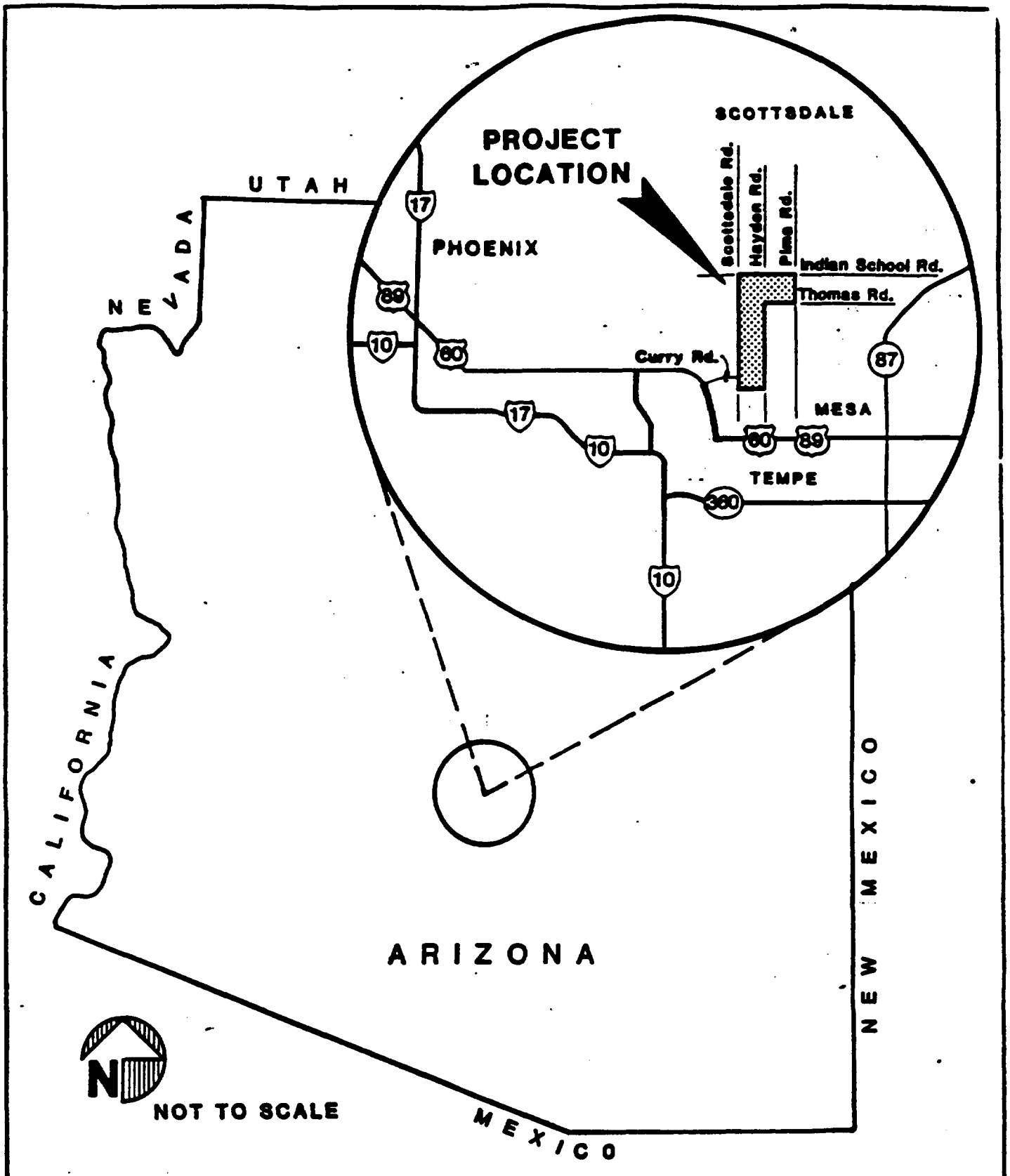
6. RM
   Name: S. Hahn/SFO
   Phone: 415/652-2426

V. PLAN APPROVAL

PLAN PREPARED BY: Mike Kemp/Susan Coleman Date: _____
APPROVED BY: Donna LaBar Date: _____

REVISED BY: John D. Lucero Date: 12/2/87
REVISION APPROVED BY: _____ Date: 12/2/87

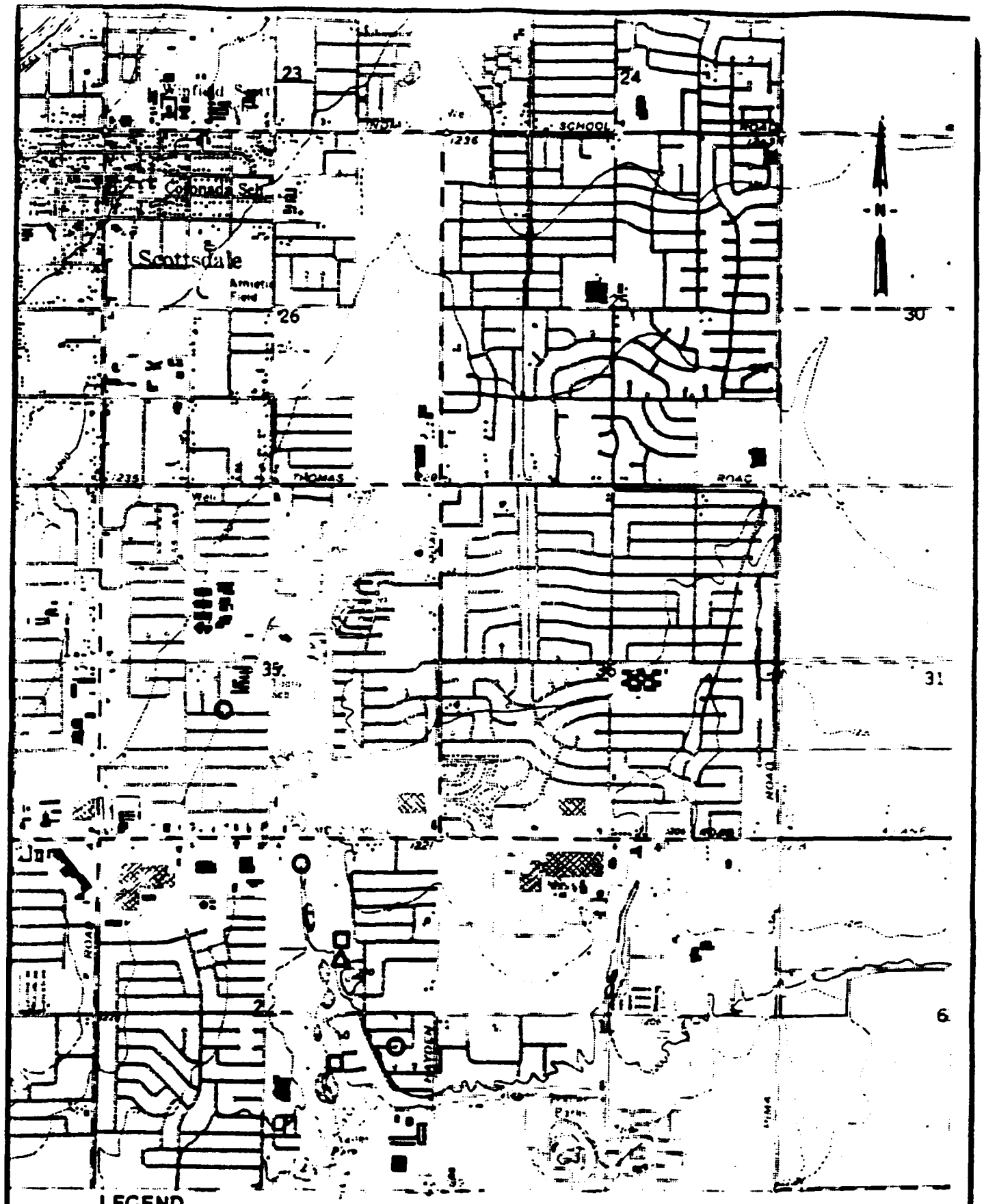
REREVISED BY: John D. Lucero Date: 9/14/87
REVISION REAPPROVED BY: _____ Date: _____



Drawing 1
SITE LOCATION MAP
MONITORING WELL CONSTRUCTION
INDIAN BEND WASH
PHOENIX, ARIZONA
NOVEMBER 1987

W63590.FQ

CH2MHILL



LEGEND

PROPOSED MONITOR WELLS:

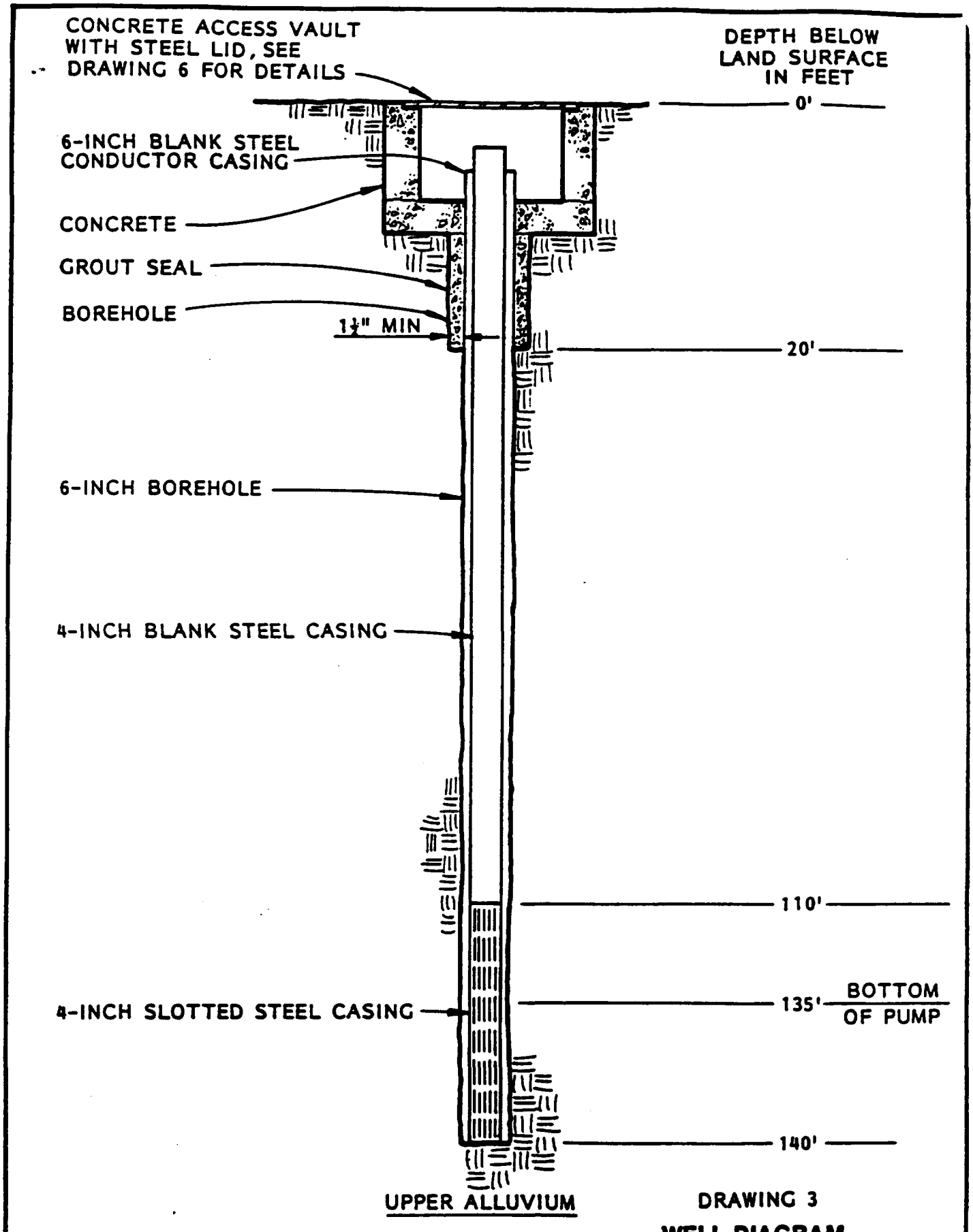
- ○— UPPER ALLUVIUM UNIT
- □— MIDDLE ALLUVIUM UNIT, UPPER PART
- △— LOWER ALLUVIUM UNIT

W63590.FQ

Drawing 2

VICINITY MAP

MONITORING WELL CONSTRUCTION
INDIAN BEND WASH
PHOENIX, ARIZONA
NOVEMBER 1987



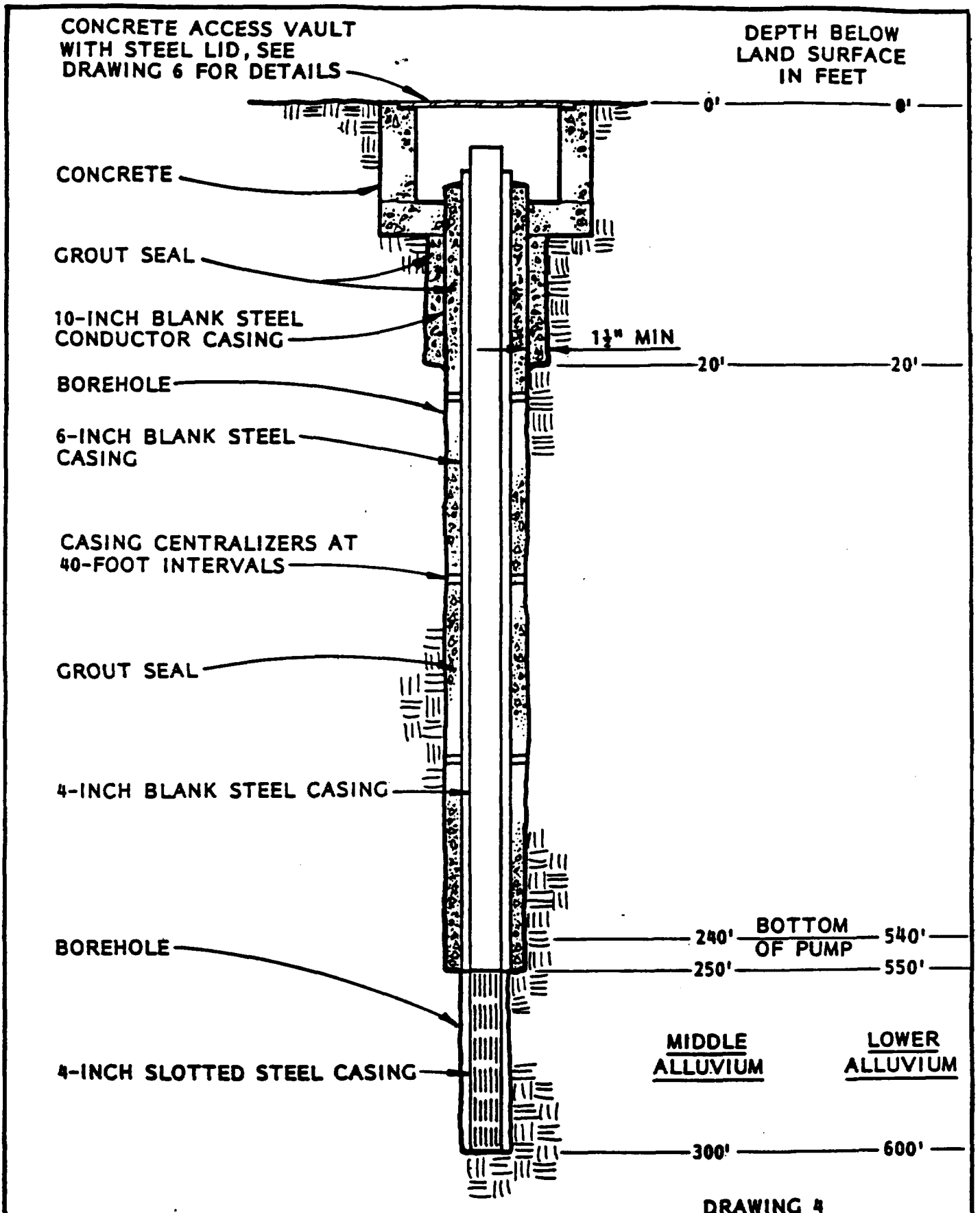
DRAWING 3

WELL DIAGRAM

MONITORING WELL CONSTRUCTION
INDIAN BEND WASH
PHOENIX, ARIZONA

NOVEMBER 1987

W63590.FQ

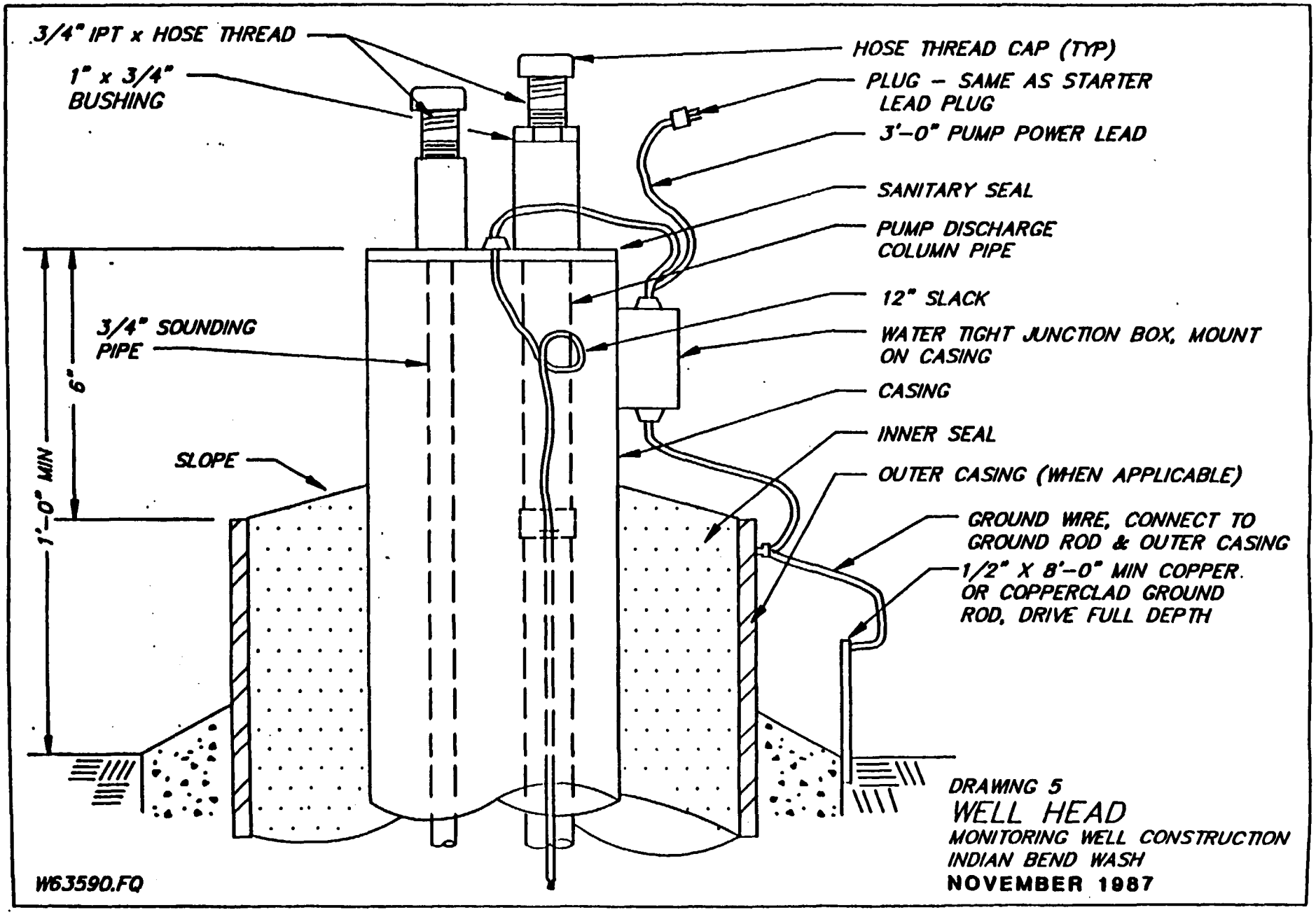


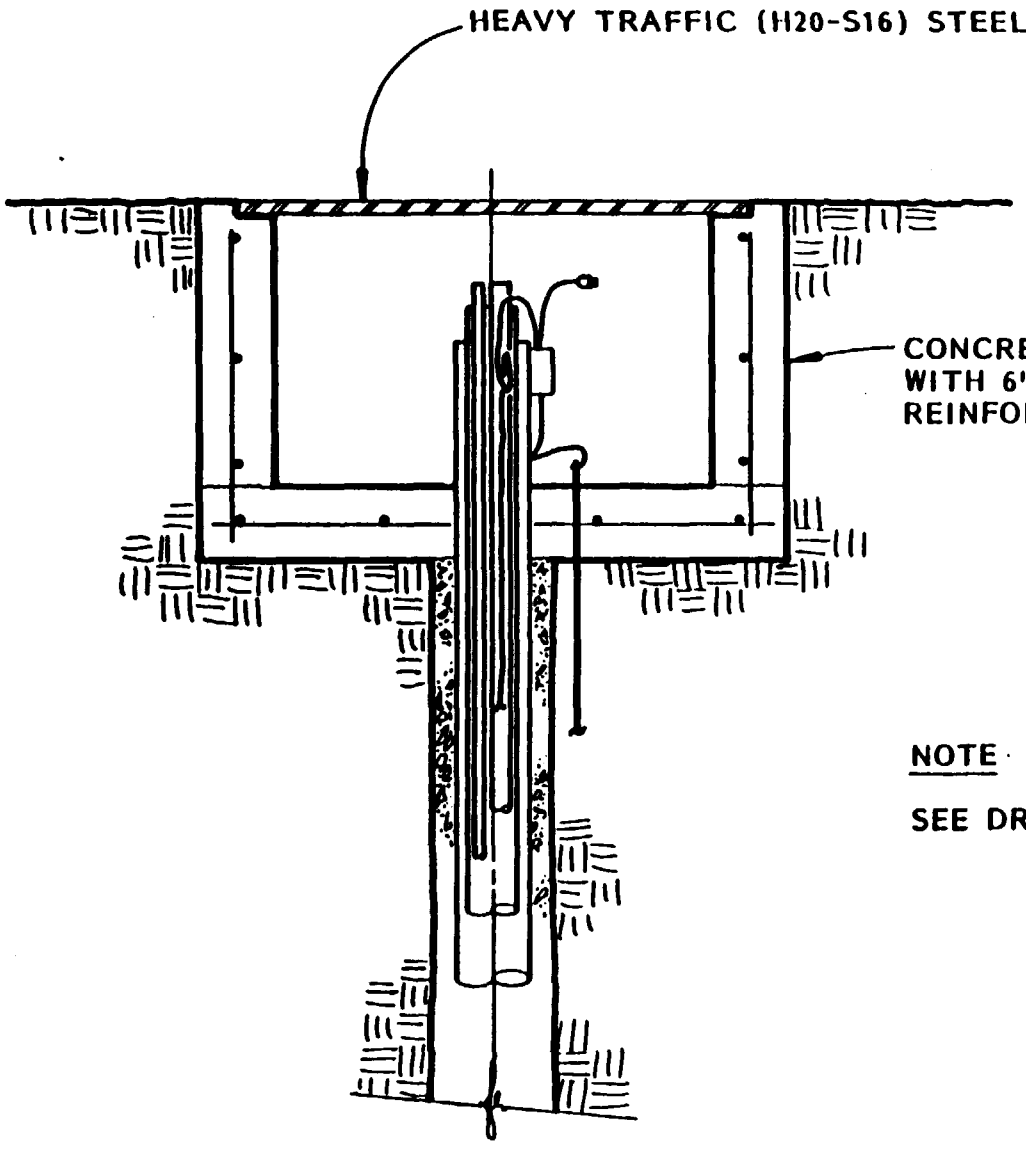
DRAWING 4

WELL DIAGRAM

MONITORING WELL CONSTRUCTION
INDIAN BEND WASH
PHOENIX, ARIZONA
NOVEMBER 1987

W63590.FQ


3/4" IPT x HOSE THREAD
1" x 3/4" BUSHING
HOSE THREAD CAP (TYP)
PLUG – SAME AS STARTER LEAD PLUG
3'–0" PUMP POWER LEAD
SANITARY SEAL
PUMP DISCHARGE COLUMN PIPE
12" SLACK
WATER TIGHT JUNCTION BOX, MOUNT ON CASING
3/4" SOUNDING PIPE
6"
1'–0" MIN
SLOPE
CASING
INNER SEAL
OUTER CASING (WHEN APPLICABLE)
GROUND WIRE, CONNECT TO GROUND ROD & OUTER CASING
1/2" X 8'–0" MIN COPPER. OR COPPERCLAD GROUND ROD, DRIVE FULL DEPTH
W63590.FQ
DRAWING 5
WELL HEAD
MONITORING WELL CONSTRUCTION
INDIAN BEND WASH
NOVEMBER 1987



NOTE

SEE DRAWING 5 FOR WELLHEAD DETAILS.

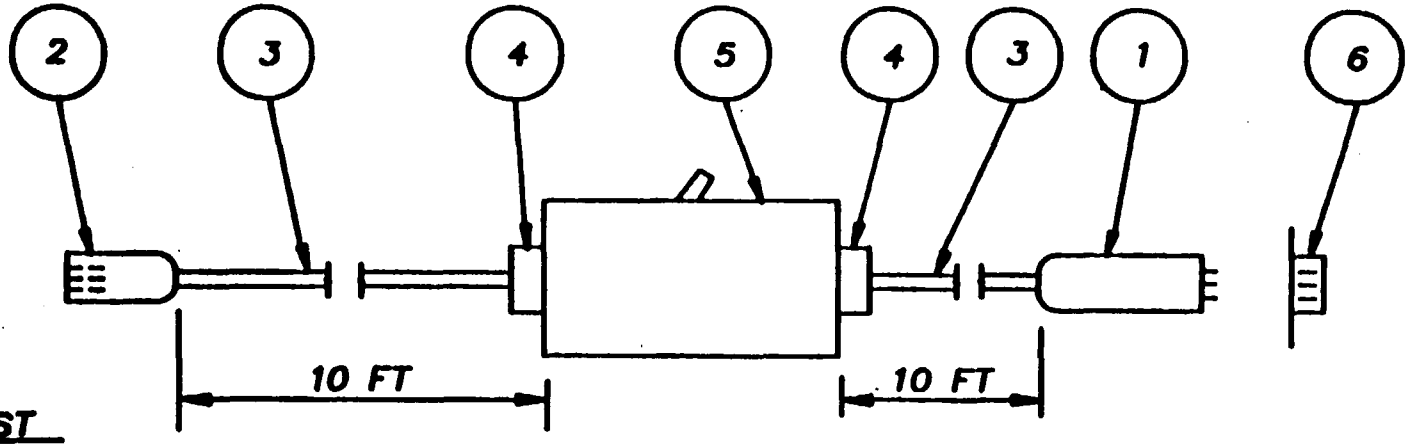
DRAWING 6

BELOWGRADE ACCESS BOX

MONITORING WELL CONSTRUCTION
INDIAN BEND WASH
PHOENIX, ARIZONA

NOVEMBER 1987

W63590.FQ



MATERIALS LIST

1. PLUG–20 AMPERE, 250 VOLT, CORROSION RESISTANT, TWISTLOCK
   NEMA L6–20P
   HUBBELL 2321 VY OR EQUAL
2. RECEPTACLE–20 AMPERE, 250 VOLT, CORROSION RESISTANT, TWISTLOCK
   NEMA L6–20R
   HUBBELL 2323 CY OR EQUAL
3. CORD–FLEXIBLE, 600V, TYPE SO, 12/2 WITH GROUND
4. CORD FITTING AND STRAIN RELIEF CONNECTOR
   CROUSE HINDS CGB SERIES; KILLARK Z SERIES; OR EQUAL
5. MOTOR START SWITCH–MANUAL MOTOR STARTER WITH OVERLOAD PROTECTION. TWO–POLE, 230 VOLT, SUITABLE FOR USE WITH AC SINGLE PHASE MOTORS UP TO 1 HORSEPOWER. NEMA 4 ENCLOSURE. SQUARE D CLASS 2510; WESTINGHOUSE TYPE MS OR EQUAL.
6. GENERATOR RECEPTACLE, ITEM 1 THIS LIST, HUBBELL NO. 2326 OR AS DETERMINED IN FIELD.

DRAWING 7
STARTER LEADS
MONITORING WELL CONSTRUCTION
INDIAN BEND WASH
NOVEMBER 1987

W63590.FQ

ADDENDUM TO: Subcontract Documents for Monitoring Well Construction at Indian Bend Wash, Scottsdale, Arizona.

1) Section 02602 Monitoring Well Drilling and Development, 2.1 - Drilling Fluid, 4th sentence:

Add "The Contractor shall determine in the field whether" before the words "casing shall be rotated...".

2) Section 02602 Monitoring Well Drilling and Development, 3.1.3 - Well Drilling, Middle and Lower Alluvium Unit Wells, 5th sentence:

Replace the words "shall be rotated and reciprocated..." to "may be rotated and reciprocated as determined by the Contractor in the field...".